Ordnance Survey®

OS MasterMap®

User guide

Product specification

Preface

This user guide is divided into two parts.

Part 1 (product specification) contains the information you need to make effective use of the OS MasterMap® product and service and is designed to help you understand the information contained in the data.

Part 2 (reference section) contains detailed technical information and data format specification.

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Chapter 1.1 Introduction

Using the user guide

This documentation is supplied in Portable Document Format (PDF) only. Free Adobe® Acrobat Reader® software, which displays the user guide, allows you to navigate and also incorporates search and zoom facilities. Navigation can also be carried out by clicking on the blue hyperlinks and the table of contents. Hyperlinks are used to navigate between associated parts of the user guide and to relevant internet resources.

This user guide is divided into two parts.

Part 1, as detailed below, contains basic information you will need to understand, use and manage OS MasterMap. Part 2 contains detailed technical information and data format specification.

- Chapter 1.1 provides a brief description of the concept of OS MasterMap and the base requirements specification for use of the data product.
- Chapter 1.2 gives an overview of the key features of OS MasterMap, which are fully detailed in the Reference section, OS MasterMap user guide.
- Chapter 1.3 describes the themes available.
- Chapter 1.4 describes the Topography Layer.
- Chapter 1.5 describes the Address Layer.
- Chapter 1.6 describes the Imagery Layer.
- Chapter 1.7 describes the Integrated Transport Network™ (ITN™) (Roads) Layer.
- Chapter 1.8 explains how change to a feature is applied.
- Chapter 1.9 gives an overview of the online supply service.
- Chapter 1.10 provides advice and information on how to best manage OS MasterMap data in your system.
- Chapter 1.11 deals with OS MasterMap and positional accuracy.
- Chapter 1.12 is a statement about the quality of OS MasterMap.

Appendix A is a glossary with links to and from the relevant parts of the user guide.

Appendix B describes our priorities when capturing change.

Appendix C is a product and service performance report form for you to submit any comments on OS MasterMap.

General description of OS MasterMap

OS MasterMap is a consistent and maintained framework for the referencing of geographical information in Great Britain.

It comprises detailed topographic, cartographic, administrative boundary, postal address, topological road network features positioned on the National Grid and an Imagery Layer. Every OS MasterMap feature has a unique identifier called a TOID®, which is used to refer to the feature. Key elements are:

- Seamless data – no tiles.
- Imagery – providing a reliable and consistent source of orthorectified aerial photography for Great Britain.
- TopographicArea features – the building blocks of our data, many of which represent individual real-world objects.
- Address features – the Royal Mail® Postcode Address File (PAF®) georeferenced and cross-referenced to a building where appropriate.
- Topological road network features – a structured network representing the road system and relevant information related to it.

For all layers except the Imagery Layer the following key elements apply:

- feature life cycles – all OS MasterMap features have defined life cycles linked to real-world object life cycles;
- unique identifier (TOID) – for each OS MasterMap feature;
- availability of data by themes; and
- a new system of feature classification feature attributes.

The process of creating OS MasterMap involved the re-engineering of our National Topographic Database, from which our large-scale products are derived. The new database is object oriented and stores data in a seamless form. This means we can supply any set of OS MasterMap features by area or theme, not just fixed tiles of data as in previous generations of Ordnance Survey products.

System requirements

OS MasterMap data is designed for use as an intelligent digital map within geographical information systems (GIS) and database systems. We are unable to give guidance on hardware and software requirements, since these depend entirely on how you intend to use the data. System developers can offer advice and can develop a system to suit your application.

For details of Ordnance Survey's Licensed Partners, who can incorporate OS MasterMap in their systems, please see the systems/software page on our web site.

To help in your system planning the following approximate (compressed) file sizes, for the Topography Layer only, are:

1 Birmingham (urban)

Area: 266.976 km²
880 Mb

2 Carmarthenshire (mainly rural)

Area: 2 453.540 km²
410 Mb

3 Edinburgh (urban)

Area: 272.392 km²
290 Mb

4 Horsham (suburban)

Area: 529.389 km²
180 Mb

5 Rutland (mainly rural)

Area: 392.478 km²
60 Mb

For estimates of file sizes for the Imagery Layer, see Chapter 1.10 Data management guidelines.

The minimum system requirements to use the OS MasterMap service are at heading Minimum system requirements for the online service in chapter 1.9.

Supply

- OS MasterMap incorporates a web-based ordering system that allows you to order your initial data supply and update (change-only or full resupply), obtain price estimates and view details of your holdings.
- OS MasterMap, except Imagery Layer, is supplied in GML (Geography Mark-up Language) version 2.1.2, see Reference section, OS MasterMap user guide. Imagery Layer formats are TIFF, JPEG, ECW or MrSID, with the Imagery Layer metadata in XML.
- Both initial supply and updates are available on CD, DVD and via the FTP server, although the FTP server is limited to an order volume of 400 Mb. For initial supply we recommend that customers select CD or DVD (single side, 4.6 Gb) due to the larger volumes of data involved.
- This data is designed to be kept up to date via an online change-only update, see Change-only update service in chapter 1.9. Users may request updates of the latest changes in their area of interest at any time, using our online change information service.
- You can assign a regular date for receipt of change-only updates. These will then be sent automatically on the required media or an email sent out to inform you that the data is ready to be collected from the FTP server. See Chapter 1.9.
- You can specify the area of interest to be updated by defining your own data selection polygon around the features required, by selecting pre-defined areas by importing tile lists or your own polygons (restrictions apply). See Chapter 1.9.
- To make the management of large areas easier, data is split into chunks, each of which covers a nominal square area or part of such a square. Data chunks are unclipped – that is, features that overlap the boundary of the chunk will be supplied in their entirety, see Chunking of supply data in chapter 1.9.
- For the Topography Layer you have a choice of topological or independent polygons, see Reference section, OS MasterMap user guide, when ordering your data.
- To speed up the online supply of data and enable areas to be supplied as complete files on CD, your data will be compressed using the gzip compression method. See Chapter 1.9.

Chapter 1.2 Overview of OS MasterMap

Data overview

The purpose of OS MasterMap data is to support a wide range of customer applications that utilise geographical information. These may include:

- geographical analysis;
- geographical referencing;
- data association;
- asset management;
- route planning; and
- cartographic representation.

OS MasterMap topographic features are representations of real-world objects, including buildings, roads, tracks, paths, railways, rivers, lakes, ponds, structures (such as oil storage tanks and pylons), and land parcels. The data also includes non-topographic features such as administrative and electoral boundaries, cartographic text and symbols, and postal addresses.

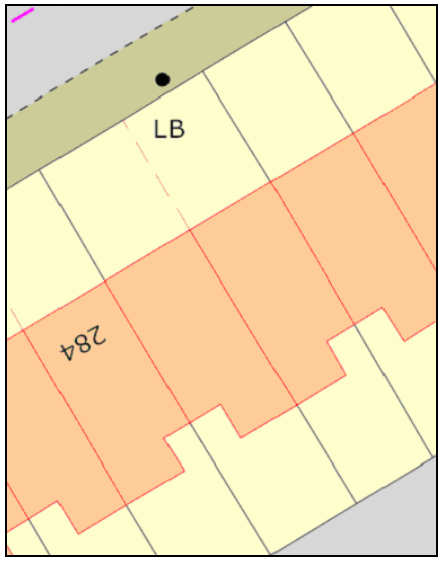
Each feature has a spatial attribute that is either a topological relationship to another feature that defines its spatial context or a geometric representation such as a point, line or polygon.

OS MasterMap ITN road features are a representation of named or numbered roads, and the physical road. These features include the road classification (such as motorway or A road) and the nature of the road (such as a dual carriageway or slip road).

OS MasterMap ITN road routing features provide information that complements the road network. These includes detail that may affect a driver's choice of route such as mandatory turns or one-way streets.

OS MasterMap Imagery Layer is not part of the feature model as it does not contain individual features, but provides a seamless source of orthorectified aerial photography that can be integrated with other layers in OS MasterMap.

In this user guide the term *real-world object* is used to describe a physical entity that can be captured and represented in the data. In the extract below, real-world objects include buildings, land and the letter box. Not all of what we are representing has a definitive physical presence, often we are expressing administrative concepts such as ward boundaries, named roads or turn restrictions. In the extract below, the red dashed line infers a property boundary where no physical boundary has been surveyed.



A real-world object is represented by a feature in OS MasterMap data. A complete list of the real-world objects and their feature representations in the Topography Layer is given in the OS MasterMap Real-World Object Catalogue.

An OS MasterMap feature within the Topography Layer may be:

- a TopographicPoint feature representing a small object, such as a letter box;
- a TopographicLine feature representing the centre line of a linear object, such as a fence or hedge;
- a TopographicLine feature representing the boundary of an area object, such as the extent of a building;
- a TopographicLine feature representing the inferred division between two objects, such as an internal house division;
- a TopographicLine feature representing the shape of the terrain, such as the top or bottom of a slope;
- a BoundaryLine feature representing an administrative boundary, such as a county;
- a TopographicArea feature representing an object bounded by a continuous sequence of line features, such as a building, road section, field or pond;
- a CartographicText feature giving additional information, such as the distinctive name of a topographic feature; or
- a cartographic symbol feature giving additional information, such as the direction of water flow.

An OS MasterMap feature within the Address Layer is:

- a point feature representing the location of a postal address.

An OS MasterMap feature within the ITN road network theme may be:

- a road feature representing a named or numbered road;
- a RoadLink feature representing the general alignment of a section of road. RoadLinks are broken at the intersection of roads, the end of roads or where there is a change of name;
- a RoadNode feature representing the intersections, crossings and ends of RoadLinks;

An OS MasterMap feature within the Road Routing Information (RRI) theme may be:

- a RoadNodeInformation feature representing routing information related to a RoadNode in the road network;
- a RoadLink information feature representing routing information related to a RoadLink in the road network;
- a RoadRouteInformation feature representing routing information related to one or more RoadLink features in the road network where direction of travel is relevant;
- a RoadPartialLink information feature representing routing information related to part of a RoadLink in the road network; or
- a RoadPartialRoute information feature representing routing information related to part of a RoadLink in the road network where direction of travel is relevant.

Feature life cycle

The life cycle (see Chapter 1.8) of each feature is matched, where practically possible, to that of the real-world object it represents. For example, a new building will become a new object in our database and will be treated as the same feature – even if it undergoes change – until the building is demolished. The main exception to this principle is the life cycles of line features, including topological network line features. These are constrained by topological structuring rules and so cannot always follow the life cycle of the real-world objects they represent. A line feature dissected by another becomes two features. This should be borne in mind when considering associating information with line features.

TOIDs

Every OS MasterMap feature has a unique identifier known as a TOID. This is a number that uniquely identifies that feature. TOIDs hold no intelligence; they are allocated sequentially as updates are applied to the database. The TOID will stay the same throughout the life of a feature. Any data you wish to associate to a feature can be done via its TOID, meaning you are attaching information to the whole feature.

In addition to the TOID, AddressPoint features also have an OSAPR (Ordnance Survey ADDRESS-POINT® Reference) identifier. Each OSAPR corresponds to a TOID. OSAPRs are included in OS MasterMap AddressPoint features so they can continue to be used as the primary identifier of postal addresses in applications based on our ADDRESS-POINT product.

Feature version numbers

Each feature also has a version number, which is incremented each time there is change of any kind to the feature in the Ordnance Survey database, see Chapter 1.8, Life cycles of OS MasterMap features. The change that causes a version number increment can be to the feature geometry or the feature attributes, and can be due either to real-world change or to processes not connected with real-world change, such as error correction or geometric cleaning and structuring. In a small minority of cases, a new version of a feature can be created without any change apparent to the user. This is due to change to private attributes that the OS MasterMap database holds but which are not included in product data.

The classification of OS MasterMap features is based on the feature type and feature description attributes. More information on feature classification can be found in the Reference section, OS MasterMap user guide.

Inferred links

OS MasterMap data also includes inferred links (see Chapter 1.12 OS MasterMap quality statements), which are not TopographicLine features, inserted to provide a more useful subdivision of area features.

These occur in situations where TopographicLine features do not serve this purpose. The most common examples are the division of private gardens where no physical boundary exists, and the division of roads into sections at junctions. These links represent inferences about the real world based only on the topographic map information, not on any other sources of fact. Inferred links in private gardens do not represent property ownership boundaries.

Seamless data

OS MasterMap data is not managed as map tiles but as a seamless representation of the whole country. There is no map tile or similar data unit; the basic units of OS MasterMap data are features. Therefore, user systems must manage OS MasterMap data at the feature level, using the TOID to reference and store information on features.

Themed data

Features are grouped into themes (see Chapter 1.3 OS MasterMap themes), such as buildings, roads and land, to enable more flexible data selection by customers. Themes should not be thought of as independent data layers, because one feature can be a member of more than one theme.

Themes allow a customer who is only interested in, say, building footprints and addresses, to select just this data. The theme(s) that a feature belongs to are determined by theme rules based on feature type and descriptive attributes. Additionally, the TopographicLine features that bound a TopographicArea feature belong to the theme of that area feature. For instance, all the line features that bound a lake are included in the water theme.

The terrain and height theme currently contains limited information. Please see the theme rules in chapter 1.3 for the contents before ordering.

Address Layer

OS MasterMap includes an Address Layer that provides a National Grid coordinate and a unique reference for each postal address in Great Britain (this includes England, Scotland and Wales, but not the Isle of Man, the Channel Islands or Northern Island). The creation process for Address is the addition of Ordnance Survey National Grid references, and metadata to Royal Mail's Postcode Address File (PAF).

The PAF contains postal address data for approximately 26 million delivery points. These delivery points may be premises that are shown in OS MasterMap data, such as buildings, or features that do not form part of the OS MasterMap specification, such as temporary buildings and houseboats. All valid addresses in PAF, to which coordinates can be allocated, will be in the Address Layer.

ITN (Roads) Layer

OS MasterMap includes an ITN (Roads) Layer that currently contains Road Network and Road Routing Information themes. Other themes are likely to be added in due course. This layer consists of a fully topologically structured representation of the road network with the additional option of road routing information to enable route planning. The road network is in geometric sympathy with the underlying topographic features and includes cross references between network components and TopographicArea features (see Chapter 1.12 OS MasterMap quality statements for exceptions). The Road Routing Information is only useable in conjunction with the roads network data, so can only be estimated for and ordered together with the Road Network theme.

Imagery Layer

OS MasterMap includes an Imagery Layer that is orthorectified, enabling customers to use imagery in conjunction with other layers in OS MasterMap.

Data format

OS MasterMap, with the exception of the Imagery Layer, is supplied in compressed GML format. GML was developed by the Open GIS Consortium (OGC), a global organisation of developers and users that aims to maximise the benefit of geographic information. GML is a spatially enabled dialect of XML schema. More details on GML can be found in the Reference section, OS MasterMap user guide.

The Imagery Layer is supplied in TIFF, JPEG, MrSID or ECW formats, with imagery metadata in XML.

OS MasterMap source

OS MasterMap topographic data is sourced from our topological large-scale dataset, from which the Land-Line® product is also derived. The Address Layer is derived from the PAF, which we have matched to buildings in the Topography Layer where such a building exists or to an approximate position. The basis for the ITN (Roads) Layer was the OSCAR Asset-Manager® product supplemented by a significant quality improvement flowline to ensure geometric sympathy with the Topography Layer. There was also a large data collection exercise to add a richer classification and to capture road routing information.

The data is captured and maintained primarily by the following three processes:

- continuous revision by our network of field offices around the country;
- centralised activity driven by external intelligence sources; and
- cyclic revision by photogrammetric surveys.

There have been some changes to surveying practices due to OS MasterMap requirements, such as in the way we update features when real-world objects change to correctly manage feature life cycles (see Chapter 1.8 Life cycles of OS MasterMap features.)

The OS MasterMap Imagery Layer has been created using imagery from internal and external sources.

What's new in version 5?

Improvement to the Land-Line tile importer

The upper limit for the Land-Line tile importer has now been increased from 3 000 to 240 000, which is greater than the total number of Land-Line tiles currently available. Very large tile lists can be downloaded providing that the number of individual polygons created does not exceed 3000.

Change-only update scheduling

Customers will now be able to specify a regular date for the receipt of change only update. See Chapter 9.

Pre-defined and user-defined areas

The pre-defined area tree structure has been rearranged to make selection more intuitive. Pre-defined areas now follow a more logical sequence based on a hierarchical geographical location, for example, counties with their districts and unitary authorities, rather than being arranged alphabetically.

Metropolitan Counties are also included as a new choice for selection.

The following features will also be included to aid selection of customer data:

- User-defined polygons to be rescalable without the need to redraw the whole area;
- The ability to specify a buffer around pre-defined areas to a maximum of 10 000 metres;
- The inclusion of a transparency slider bar to allow customers to be able to fade between available imagery and backdrop mapping.

Chapter 1.3 OS MasterMap themes

Principles of OS MasterMap themes

What is a theme?

A theme is a fixed set of features that can be collectively selected for supply by users. A feature can be a member of any number of themes. All features supplied in the product belong to at least one theme.

A theme is created by applying rules based on the attributes of OS MasterMap features. For instance, the rule for membership of the water theme is that the descriptiveGroup attribute of the feature must be one of tidal water, or inland water. A theme rule can put conditions on more than one feature attribute. A feature is a member of every theme for which it passes the theme rules.

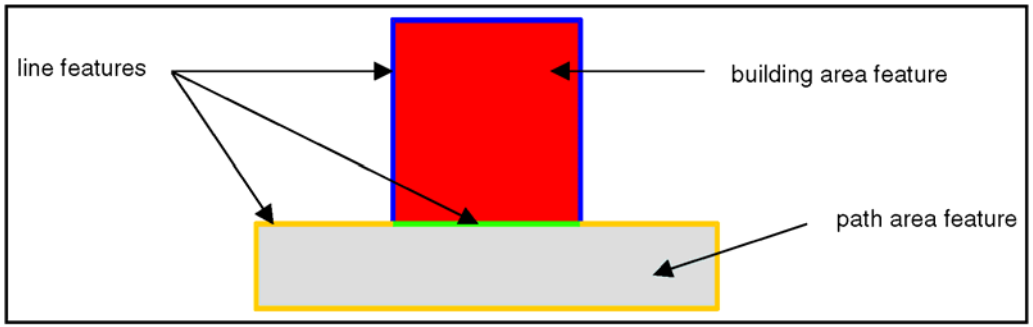
Themes are not part of the classification system of OS MasterMap features. A new theme can be created for the convenience of users, without in any way affecting either the existing themes or the classification of OS MasterMap features.

Themes of line features that bound area features

In addition to being a member of each theme for which it passes the theme rule, a line feature that is part of the boundary of one or more area features is also a member of the themes of those area features. So any line feature that bounds an area feature that is a member of the roads, tracks and paths theme, is also a member of the roads, tracks and paths theme, in addition to any other themes to which it belongs.

Simple example of themes

Consider two area features representing a building (coloured red in the diagram) and a section of pavement (coloured grey in the diagram). They are bounded by three line features, coloured blue, green and orange in the diagram.



Application of the theme rules:

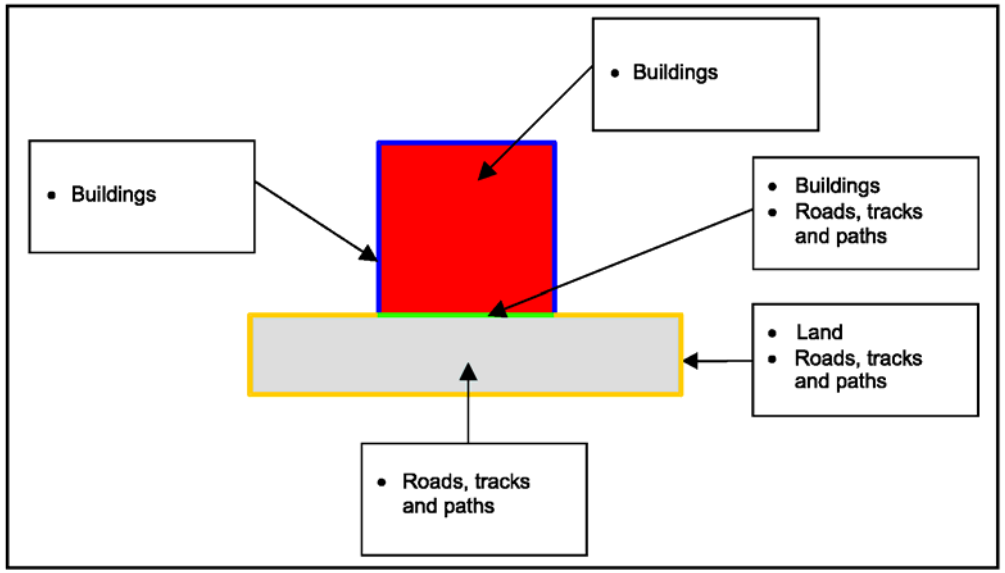
The area feature representing the building has a descriptiveGroup attribute with the value Building so it passes the rule to be a member of the buildings theme. It does not pass the rules of any other themes.

The area feature representing the pavement has a descriptiveGroup attribute with the value Path, so it passes the rule to be a member of the roads, tracks and paths theme. It does not pass the rules of any other themes.

The two line features coloured blue and green in the diagram have a descriptiveGroup attribute with the value Building, so they pass the rule to be members of the buildings theme. They do not pass the rules of any other themes based on their own attribution.

The line feature coloured orange in the diagram has a descriptiveGroup attribute with the value General, so it passes the rule to be a member of the land theme. It does not pass the rules of any other themes based on its own attributes.

The three line features are then placed in the themes of the area features they bound, giving the final assignment of features to themes shown in the diagram below.



Chapter 1.4 Topography Layer

Overview

The Topography Layer of OS MasterMap represents real-world objects such as buildings, kerb lines, fences and letter boxes, as well as intangible objects such as county boundaries or the line of mean high water. See figure 1.4.1.

Real-world objects are represented as a series of area, point, line and text features within OS MasterMap.

Ground relief features are only shown where they represent a serious hazard to passage on foot. These are features such as cliffs and man-made embankments and cuttings.

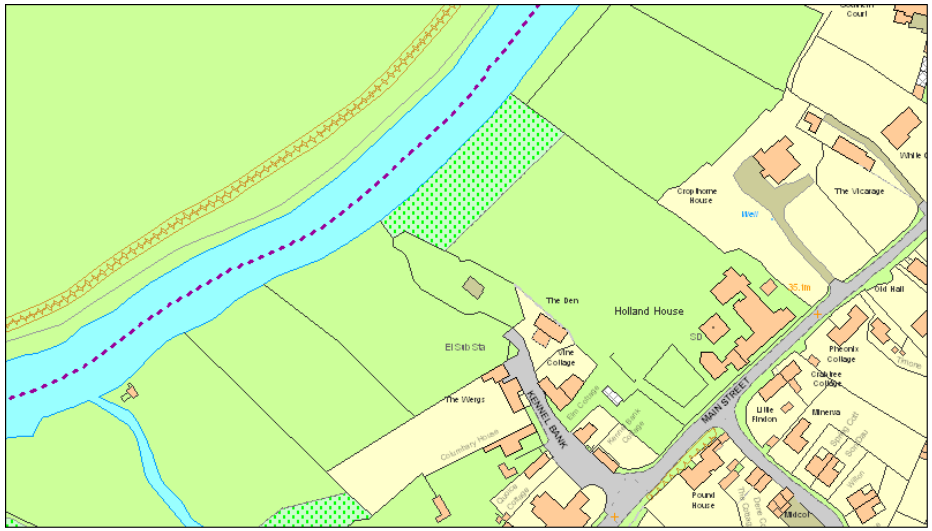


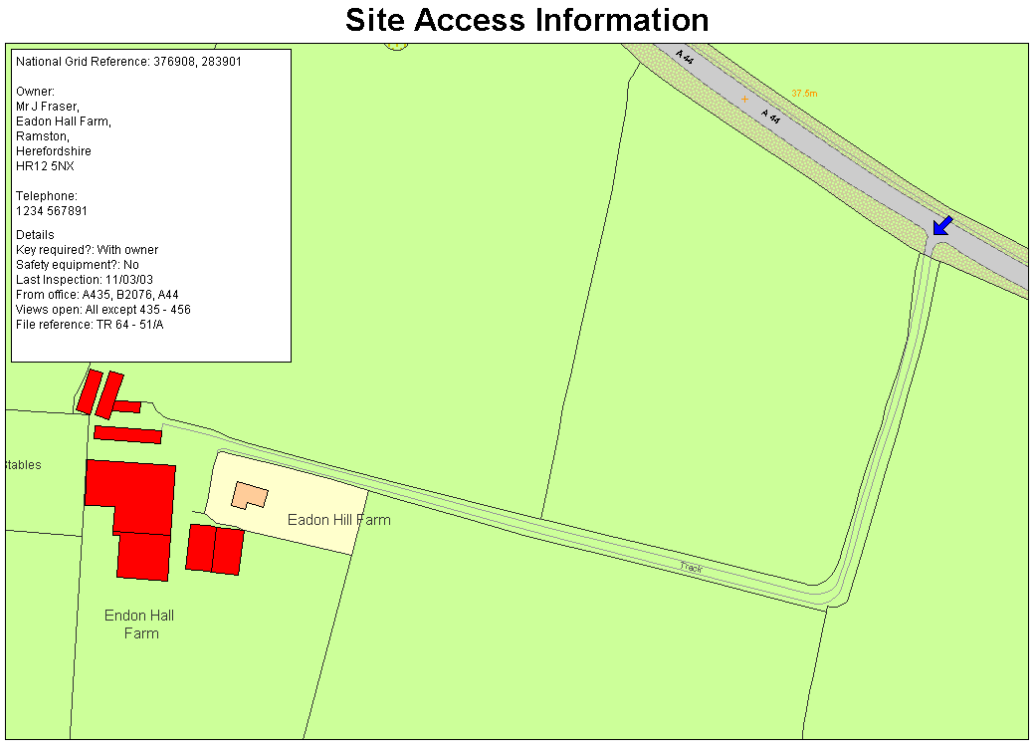
Figure 1.4.1 Example of Topography Layer data

Also included within the Topography Layer are non-physical features such as a selection of house numbers and, where numbers have not been allocated, names.

Potential uses

NOTE: In these examples OS MasterMap data has been used and manipulated with appropriate software that is not included as part of the product.

Example: OS MasterMap being used to store information regarding site access.

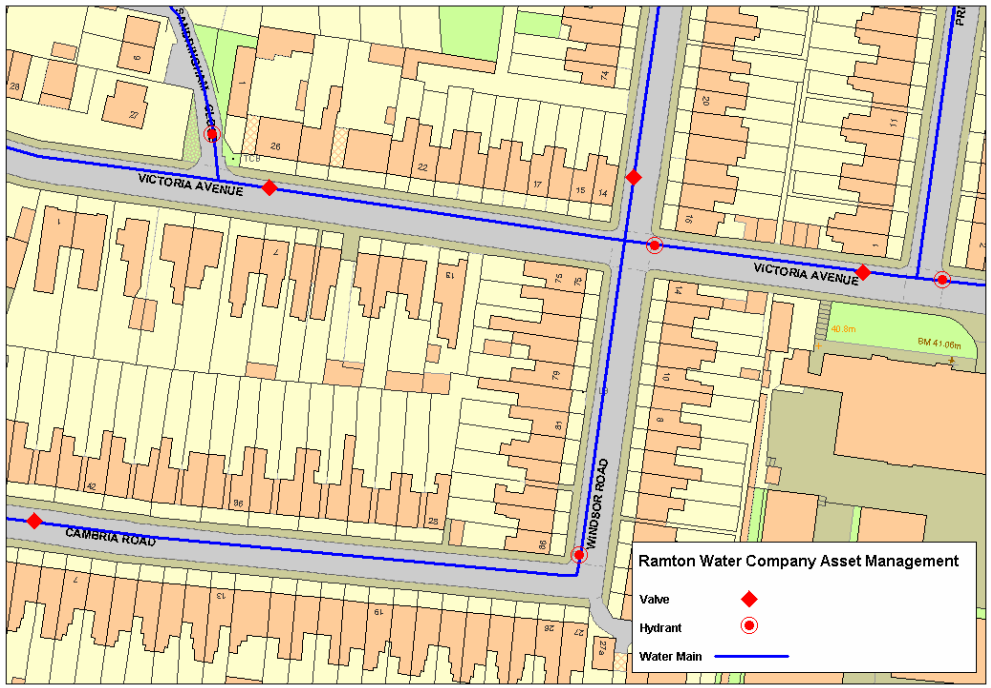


Example: Asset management

‘Do you need to record the precise location of pipelines, cable lines, valves, hydrants or junction boxes?’

OS MasterMap data may be displayed or plotted at a wide range of scales. Individual features may be distinctively coloured, symbolised or omitted.

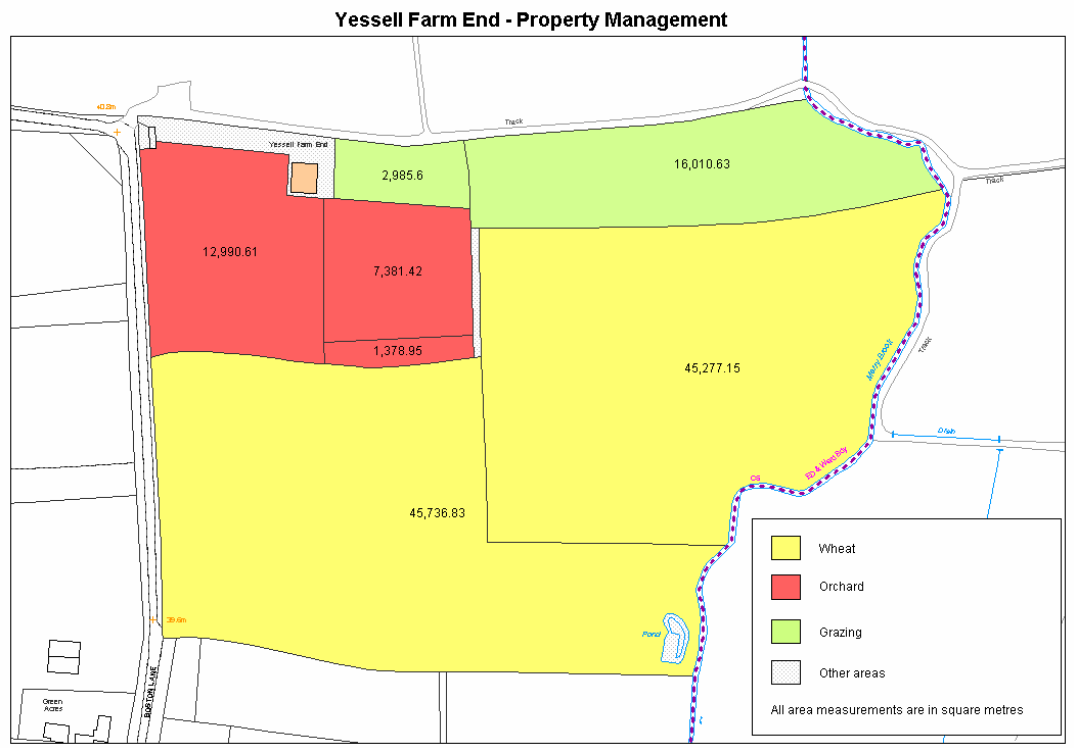
Scenario: A broken water main is causing flooding in an inner city area. It is necessary to identify the precise position of water valves quickly.



Example: Property management

‘Do you need to manage large areas of land?’

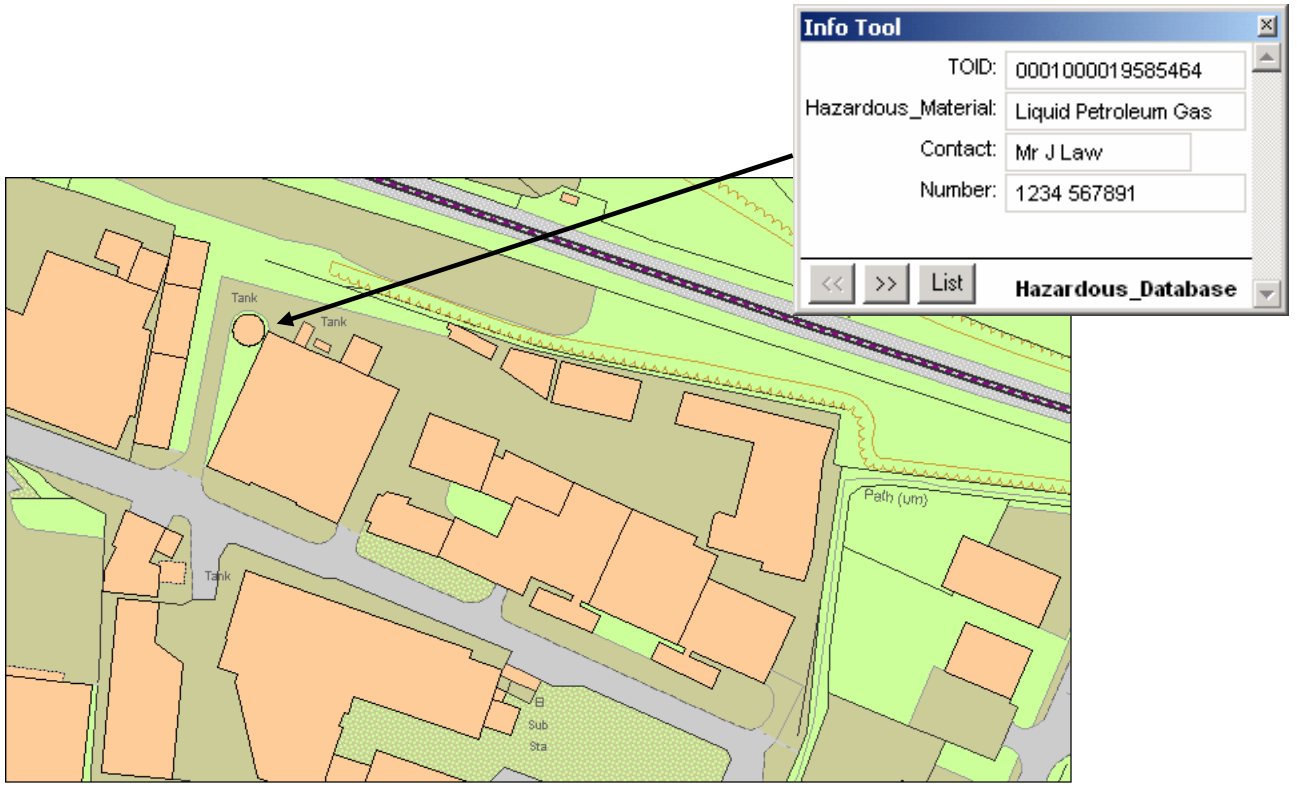
Individual polygons may be customised to identify different types of land use, terrain, value and so on. Area polygons also have a value known as the calculatedAreaValue, which allows users to determine the area of the polygon in metres square.



Example: Incident control

‘Do you need to share information with other users?’

TOIDs provide a unique reference for real-world objects that allow customers to identify and pass on information to other parties.



General principles

Wherever possible, real-world objects are represented in their true surveyed position. For the sake of clarity of display or plotting, real-world objects may be generalised, for example, small juts in house fronts. The normal methods of generalisation that can be applied to features are:

- emphasis;
- selection for inclusion;
- simplification; and
- omission.

Real-world objects may also be aggregated in OS MasterMap. For example, a small group of trees may be recorded as a single feature.

Topography Layer definitions

Distinctive text

Distinctive text is defined within the Topography Layer as a name given to a feature or place to distinguish it from other features or places of a similar nature, for example, River Avon, Hill Lane Surgery, Leeds or New Forest.

Descriptive text

Descriptive text is defined within the Topography Layer as a generic name given to a feature where a distinctive name does not apply, for example, drain, boundary post or car park.

Where the function or purpose of some features are not clear it is possible that they will be described with both a distinctive and descriptive name, for example, Sandy Lane (Track) or Old Thatched House (PH).

Permanent detail

Permanent detail is defined as physical features that it is reasonable to assume will remain in position for at least 10 years, taking into account the nature of construction or character. Natural relief features, such as hills, are not normally shown, although they may be named.

Detail that is too small to be shown at scale, but is sufficiently important or prominent, is shown by a symbol. All administrative boundaries are shown.

Indefinite detail

Indefinite detail is defined as those physical features that are significantly important and have an outline that is either liable to change or not defined precisely by any surveyable feature, for example, vegetation limits or man-made slopes. The nature of vegetation is shown, except for trees and scrub (bushes, brambles and undergrowth) growing in permanent water.

Indefinite detail is not surveyed precisely. The accuracy of survey is related to the degree of definition on the ground.

Topographic feature levels

Topographic features within OS MasterMap carry a physical level feature attribute indicating the level at which the feature lies (that is, underground, obscured, ground level, or a level above ground). See the Reference section, OS MasterMap user guide for further technical information.

Cartographic surface level

Where one level of detail exists cartographic surface level is the same as general surface level. Where more than one level of detail exists the cartographic surface level is defined as the upper surface level of surveyed detail. All features surveyed at levels below cartographic surface level are captured using obscured detail or underground detail feature codes.

Ground surface level

The definition of ground surface level is usually self evident. Where more than one level of detail exists, ground surface level is defined as the lowest level of surveyable detail that can be surveyed in relation to other detail, but is not underground.

Those features that are less than 0.3 m in height are given different coding to distinguish them from those above 0.3 m. These are usually features that do not pose an obstacle to pedestrians, such as kerbs. See figure 1.9.2.

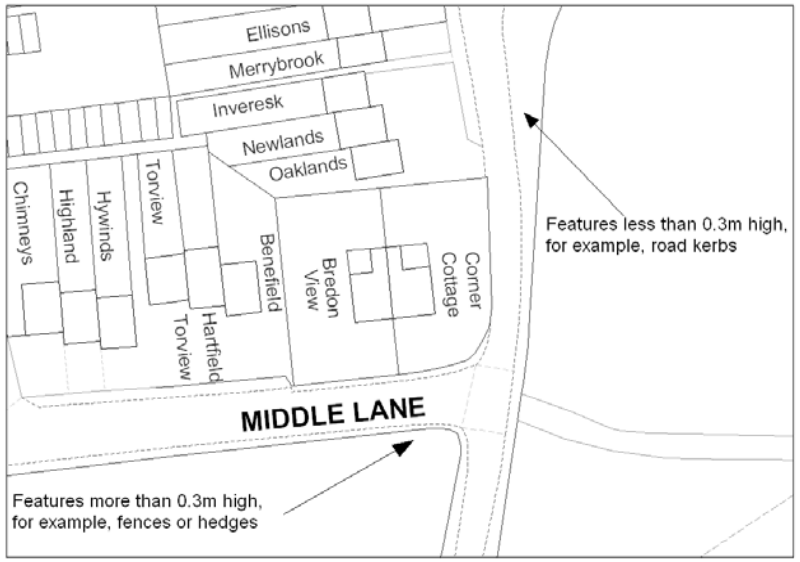


Figure 1.9.2: Example of ground surface level features

Overhead level

Features that exist above the ground surface level are defined as overhead detail. Examples of overhead features include electricity transmission lines, ropeways, gantries, ski lifts and some pipelines. This does not include bridges, which are classified as ground surface level.

Overhead features, such as pipes within an industrial installation, are not shown where they form an integral part of that installation. Depiction of overhead features entering such installations is terminated at the first support or building within the perimeter.

Underground level

Detail that has required excavation below the ground surface, either without disturbance of the ground surface above or where a replacement of the ground surface occurred after excavation. This does not include obscured detail, but it does include tunnels and subways.

Because of their nature, tunnel alignments are not captured to the same accuracy as features on the surface.

Obscured level

Where more than one level of detail exists, all detail that meets the specification for capture positioned below cartographic surface level and either at or above ground surface level is captured as obscured detail.

Parallel features

Where a fence, hedge or wall runs approximately parallel to another feature and so close that they cannot both be plotted correctly at scale of survey then only one feature is shown in OS MasterMap. In determining which feature to include, the following hierarchy is used by the surveyor:

1 Include if the feature is used to mere an administrative boundary.

2 Include if the feature appears to define the extent of a property.

3 Include if the feature appears more important, for example if there is a hedge next to a cattle protection fence, show the hedge.

Topography Layer themes

The Topography Layer is broken down into nine themes: administrative boundaries; buildings; heritage and antiquities; land; rail; roads, tracks and paths; structures; terrain and height and water. These themes make it easier to access specific elements.

NOTE: The following sections only give an indication of real-world objects that may appear in the Topography Layer themes. See Chapter 1.3 OS MasterMap themes for further explanation on themes.

Administrative boundaries

Boundary alignments are shown within the administrative boundaries theme, as well as the boundaries relationship to real-world objects, its mereing, and boundary descriptions, where needed for clarification.

The following types of boundary are shown within the administrative boundary theme:

Parliamentary boundaries

- European electoral region;
- county constituency;
- borough constituency (England and Wales);
- burgh constituency (Scotland);
- assembly electoral region and assembly constituency (Wales); and
- parliamentary electoral region and parliamentary constituency (Scotland).

Local government boundaries

- In England:
  - county;
  - City and County of London, district, London borough, unitary authority and metropolitan district;
  - civil parish and the Inner and Middle Temples;
  - electoral division; and
  - ward.
- In Wales:
  - unitary authority;
  - community; and
  - electoral division.
- In Scotland:
  - unitary authority; and
  - ward.

Boundary alignments

Administrative boundaries may or may not have a predefined relationship with the topographic features in their locality. This relationship is known as a *boundary mereing*. This relationship is recorded within OS MasterMap as a textual description. A list of the most common abbreviations is given below.

Object or mereing	Abbreviation	Object or mereing	Abbreviation
Baulk, bank, base, basin, bridge, broad	B	Mean high water	MHW
Cam, canal, causeway, centre of, channel, cliff, conduit, cop, course of, covered, culvert, cut	C	Mean high water springs (Scotland only)	MHWS
Dam, ditch, dock, double, down, drain	D	Mean low water	MLW
Double ditch or drain	DD	Mean low water springs (Scotland only)	MLWS
Double fence	DF	Metres	m
Defaced	Def	Old	O
Edge of, eyot	E	Passage, path, plate, pond, post	P
Face of, fence, fleet, foot, freeboard	F	Race, railway, ride, river, road, root of	R
Feet	ft	Root of hedge	RH
Harbour, hedge	H	Scar, sewer, side of, slope, sluice, stone, stream	S
Inches	Ins	Top of	T
Kerb	K	Track	Tk
Lade, lake, lead, loch, lockspit, lynchet	L	Undefined	Und
Marsh, mere, moat	M	Wall, weir	W

The following are examples of combined abbreviations:

Object or mereing	Abbreviation
Centre of bank, basin, baulk, broad and so on	CB
Centre of railway, river, road and so on	CR
Centre of old course of stream	COCS
1.22 metres root of hedge	1.22m RH

NOTE: Special rules apply to boundary mereings and only the more common ones are listed.

Where the mereing relationship of any boundary alignment changes or where a boundary changes from one side of a real-world object to another, the point of change is shown by a boundary half-mereing change symbol, usually in opposing pairs. The location of the boundary half-mereing symbol is coincident with the boundary alignment and not the feature to which it is mered.

Physical features shown in the administrative boundaries theme:

- boundary posts;
- boundary stones; and
- boundary markers.

Non-physical features shown in the administrative boundaries theme:

- alignments of boundaries; and
- textual descriptions of:
- boundaries;
- boundary mereings; and
- boundary posts and stones.

Application of feature code precedence

Where two or more boundaries are coincidental a single alignment is shown by the most important boundary in the following order:

- In England and Wales:
- county, city & County of the City of London unitary authority, district, London borough and metropolitan district
    - civil parish, community, inner and middle temples
    - European electoral regions, county/borough constituencies
    - Welsh Assembly electoral region
    - electoral division, and/or ward.
- In Scotland:
    - unitary authority
    - European electoral regions, county/burgh constituencies
    - Scottish parliamentary electoral region
    - ward

A textual description is used for clarification.

If the alignment of an administrative boundary coincides with any other feature (other than another boundary), then both will be shown in their respective themes.

Buildings

All permanent buildings (defined as physical features, which it is reasonable to assume will remain in position for at least 10 years) whose plan outline covers an area of 8 m^2 or more are captured unless within private gardens when the minimum size is 12 m^2. Smaller permanent buildings are shown when the building is in such a detached position as to be an important topographical feature – it is then exaggerated and shown at minimum size.

Buildings are always shown regardless of size when the building has been used for a bench mark.

With a few exceptions, for example, by describing government offices or hypermarkets, no distinction is currently made between residential, private, public, commercial or industrial buildings.

Physical features shown in the buildings theme:

- roofed buildings (of sufficient size or importance to be shown);
- mobile or park homes that are permanent, residential and have a postal address;
- archways and covered passageways where the alignment can be determined from outside the building;
- horticultural glasshouses over 50 m^2*; and
- covered tanks.

Features such as cooling towers, uncovered tanks, bridges and monuments are shown within the structures theme.

*The specification for the capture of glasshouses has recently been clarified. Only glasshouses over 50 m^2 that serve a horticultural purpose will continue to be seeded as glass structures. Other glass structures, such as office buildings and conservatories, exist within OS MasterMap. These will generally be updated through deletion.

Non-physical features shown in the buildings theme:

- house numbers;
- descriptive building names; and
- distinctive building names.

Heritage and antiquities

For Ordnance Survey purposes, antiquities are defined as existing artificial features of a date not later than AD 1714 (the date of the accession of George I), together with very important sites of battlefields and natural features connected with important historical events. Exceptionally, features and sites of a date later than AD 1714 may be treated as antiquities if they are of national importance.

The investigation, recording and surveying of archaeology is the responsibility of the three Royal Commissions on Ancient and Historical Monuments (RCAHMs), England, Scotland and Wales.

Antiquity find sites are not shown in OS MasterMap.

Ordnance Survey has no responsibility for defining the authenticity of distinctive or descriptive names of antiquities.

Physical features shown in the heritage and antiquities theme:

- due to the variety of real-world objects in this theme they will not all be listed, but they do include:
    - standing stones;
    - earthworks;
    - hill figures;
    - ruined buildings;
    - tombs; and
    - stone circles.

Non-physical features shown in the heritage and antiquity theme:

- textual descriptions for the real-world objects; and
- battle sites.

Constraints imposed by survey principles

Many earthworks are of low relief and do not meet Ordnance Survey survey criterion. To depict the feature clearly it may be necessary to exaggerate antiquity detail. In mountain and moorland areas some antiquity features may be generalised without losing the essential characteristics of the depiction.

Land

The land theme encompasses those areas that do not form part of another theme, such as water, rail or roads, tracks and paths. For example, a grass verge next to a road would appear in the roads, tracks and paths theme, whereas a park area would be in the land theme.

OS MasterMap does not attempt to record the shape of the earth. The limits of geographical features, such as hills and valleys are not recorded, although the distinctive names of these geographical features are shown.

Physical features shown in the land theme include:

- parks, playing fields, football pitches, golf courses and so on;
- slopes and cliffs;
- car parks;
- gardens;
- woodlands; and
- other areas of vegetation, including scrub, heath, rough grass and marshland.

Non-physical features shown in the land theme:

- text descriptions of some land theme features.

Rail

The Topography Layer of OS MasterMap contains information relating to permanent railways that form communication between two points, for example from railway station to railway station or from an industrial building to a private quarry. The rail theme contains the names of all stations, junctions and termini.

Standard gauge railways are shown to scale by a pair of rails, separated by the correct distance of 1.435 m. Railways narrower than 1.435 m are deemed to be narrow gauge and are shown by a single line representing the central alignment. Tramways, metros and light rapid transit systems are treated as railways.

Underground portions of the Metropolitan and District lines in London that are close to surface level are shown. Where a deep level tube railway comes to the surface and continues as a normal railway it is shown as a standard gauge railway. In other cities only the sections of underground railways that are open to the sky are currently shown.

Physical features shown in the rail theme:

- level crossings;
- lighting towers;
- loading gauges;
- turntables;
- mile or kilometre posts and stones;
- sand drags;
- signal posts, bridges and gantries;
- switches and slips;
- retarders;
- bridges and viaducts;
- mail pickups;
- rails;
- permanent way; and
- station buildings and platforms.

Physical features not shown in the rail theme:

- minor railway related features such as:
  - telephones associated with level crossings;
  - conductor rails and overhead wires for electrified trains;
  - detail beneath the roofs of railway stations;
  - water troughs; and
  - repetitive features, such as signal lights within marshalling yards.

Non-physical features shown in the rail theme:

- text descriptions of all railway and associated railway features.

Roads, tracks and paths

Roads

For Ordnance Survey purposes, a road is defined as a metalled way for vehicles.

Roads that form part of the public network and those that are private and over 100 metres in length are included with the Topography Layer.

Tracks

A track, for Ordnance Survey purposes, is defined as an unmetalled way that is clearly marked, permanent and used by vehicles. Tracks are only recorded in private gardens if they are 100 metres or more in length. They need not be all weather.

All tracks are described as Track, or Tk if required to be abbreviated. Distinctively named tracks have their name recorded, for example, HICKS LANE (Track).

Paths

For Ordnance Survey purposes, a path (made or unmade) is defined as any established way other than a road or track.

Made paths

Made paths are those whose surface is paved or metalled. Only major paths are shown in parks, public gardens, cemeteries and so on. Made paths are described by the annotation Path, except in the following circumstances:

- in built-up areas the description will not normally be recorded; and
- if the path has a distinctive name, such as Simmons Walk.

Unmade paths

Unmade paths are those that are neither paved nor metalled. An unmade path is included in the Topography Layer when its entire length is evident on the ground and it starts at a road, track or path and finishes at a similar feature or a specific place of interest. Unmade paths are described by the annotation Path (um) in urban and rural areas.

Rights of way

Physical features shown in the roads, tracks and path theme (please note that rights of way are not identified in the Topography Layer. The representation of a road, track or path is no evidence of a right of way):

- kerb lines or the limits of metalling representing:
  - carriageway limits, including any hard shoulder or shallow drainage gullies forming the side of the road on dual carriageways or motorways;
  - kerbed roundabouts;
  - traffic islands in roads, except when very small (traffic islands must be 8 m^2 or more);
  - traffic calming measures forming a physical obstruction, including pinch points*;
  - dedicated cycle lanes;
  - fords; and
  - car parks,
- edges or centre alignments of tracks and paths;
- the treads of steps;
- road furniture such as:
  - mile posts†;
  - guide posts (traditional finger posts only);
  - kerb barriers;
  - gates across roads;
  - posts preventing vehicular access;
  - weighbridges; and
  - cattle grids
- road-bounding features such as:
  - hedges, walls, fences and banks; and
  - crash barriers (where they form the sole bounding feature of a carriageway).

Non-physical features shown are:

- textual descriptions – whether they be descriptive or distinctive.

* These features are recent additions to the specification and are being retrospectively captured as part of the revision process. There is not expected to be national coverage of such features within the Topography Layer for five years, dependant upon the progress of the revision programme.

† These features are no longer captured under current specification and will only be maintained through deletion.

Constraints imposed by survey tolerances

The following two situations are treated in the following ways:

- Where the central alignment of an unmade path is less than 1 m (urban areas) or 2 m (rural and moorland) from an adjacent building, fence, hedge or wall, the central alignment is shown at that minimum distance away from the feature.
- Where one edge of a track is parallel and close to the bank of a water feature, the track edge nearest to the river is omitted.

Structures

The Topography Layer contains information relating to all permanent structures that are large enough to be included.

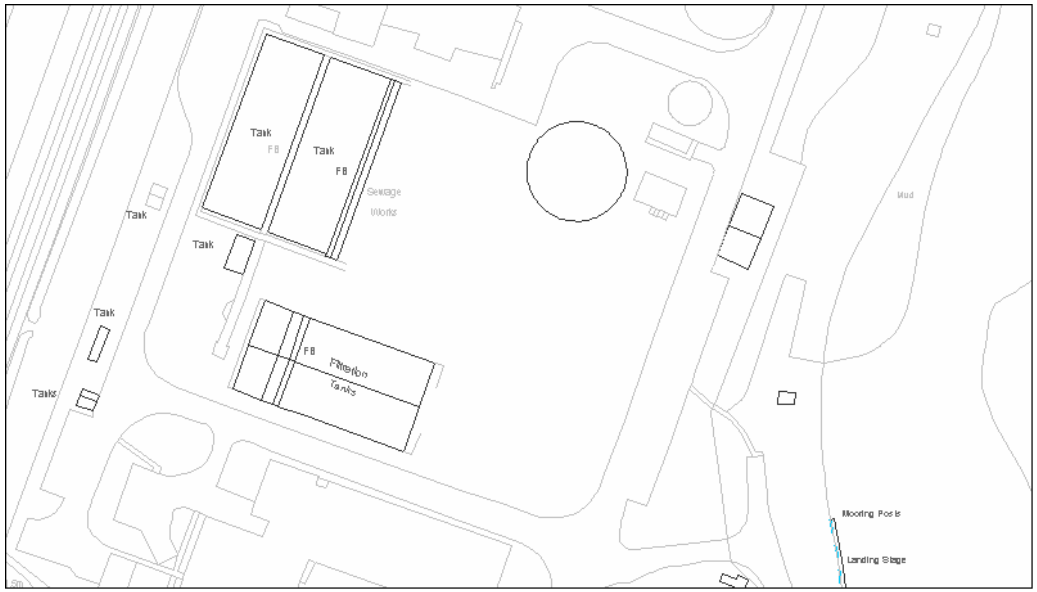


Figure 1.4.3: Examples of real-world objects in the structure theme.

Physical features in the structure theme include:

- detached monuments;
- fountains;
- covered reservoirs;
- pylons;
- weirs and sluices;
- gas holders;
- double walls;
- pontoons;
- uncovered tanks;
- conveyors;
- cooling towers;
- upper levels of communication; and
- bridges, viaducts, aqueducts and piers.

Terrain and height

For the latest information on transformations and control, visit the Ordnance Survey web site at www.gps.gov.uk.

The Topography Layer shows three types of control point:

- Triangulation stations – these are physical marks that represent one point in the national triangulation scheme. The best known form is the triangulation pillar, often found on hill or mountain tops. Please note that more up-to-date and detailed information about a triangulation station may be held by Ordnance Survey. The coordinates of a triangulation station in the data are not usually the very accurate coordinates for the control point. The accurate coordinates of the control point can be obtained from Ordnance Survey.

  All triangulation stations are shown except for buried and surface blocks.

- Bench marks – these are physical marks, the altitude of which (relative to Ordnance Datum) has been determined by levelling. The best known form is an arrow cut into masonry, often found on building corners and bridges. All current bench marks (except for those on a triangulation pillar) are shown by a point feature or symbol. The altitude to two decimal places of a metre is shown by a textual description. Please note that more up-to-date and detailed information about a bench mark may be held by Ordnance Survey.

  The bench mark symbol is not shown on triangulation pillars.

- Spot heights – these are non-physical points, the altitude of which (relative to Ordnance Datum) has been determined by levelling. All current spot heights are shown by a point feature or symbol. The altitude to one decimal place of a metre is shown by a textual description.

Physical horizontal and vertical control features shown are:

- bench mark; and
- triangulation station.

Non-physical horizontal and vertical control features shown are:

- spot height; and
- textual descriptions for the features described above.

Constraints imposed by survey tolerances

The bench mark symbol is usually oriented at 90° to the face of the object on which the mark is placed. It may be pivoted through up to 30° to avoid obscuring nearby detail.

Water

Continuous topographical water features that extend into private gardens are shown.

Linear water features (such as streams and rivers and so on) are normally shown to scale. If, however, the width of such features is less than a certain size, then they are shown as a single line.

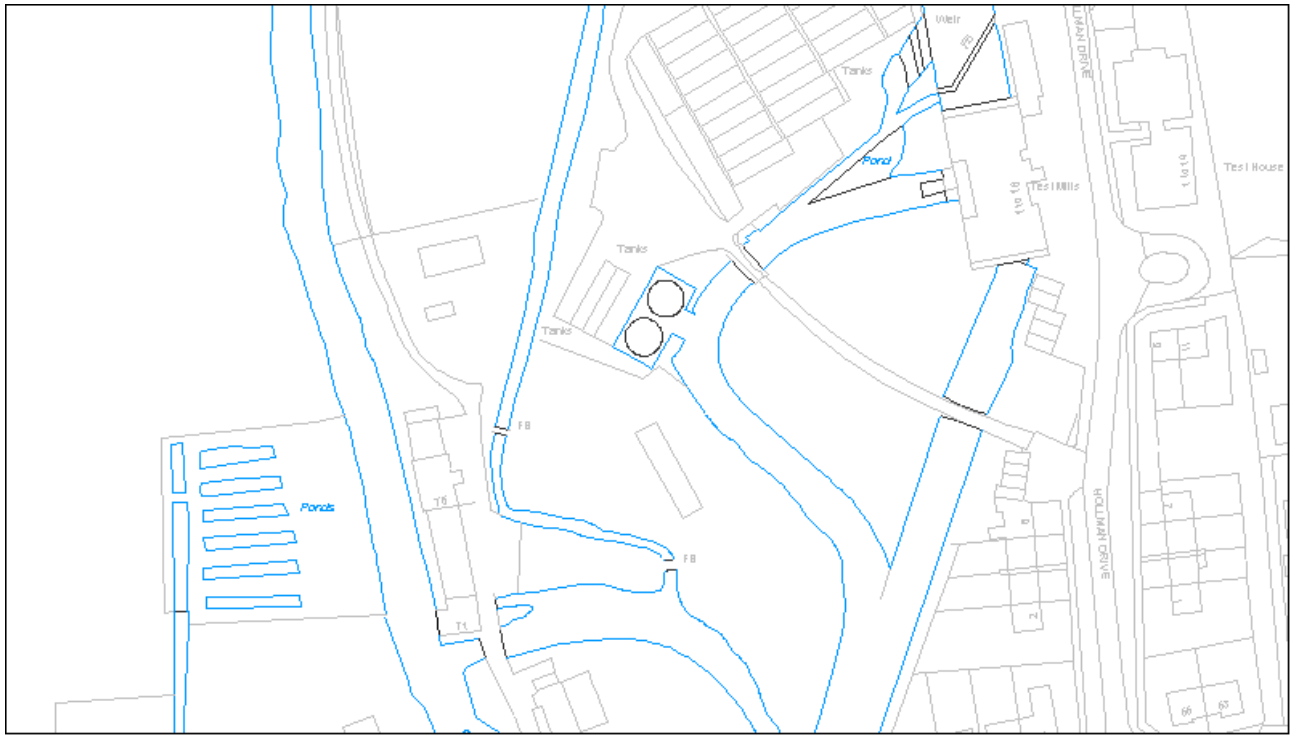
Ordnance Survey shows high and low water marks of a mean average tide, that is an average tide halfway between spring and neap tides in England and Wales, and of average spring tides in Scotland. In tidal rivers the point to which mean tides (or spring tides in Scotland) flow at high or low water is included.

Lakes and ponds are surveyed at normal winter level; reservoirs are shown at top water level, that is spill-over level.

All water features are described.

The highest point in a river to which normal tides flow is described as normal tidal limit (NTL).

Figure 1.4.4: Example of real-world objects in the water theme (shown in blue and black)



Physical water features shown are:

- mean high water (springs) and mean low water (springs), except where passing beneath a permanent structure such as a jetty;
- canals;
- lakes and lochs;
- ponds;
- bridges and footbridges;
- moats;
- reservoirs;
- rivers;
- streams;
- drains and ditches;
- foreshore features;
- floating objects – only shown when they are fixed and attached to permanent detail;
- shake holes and swallow holes (in mountain and moorland areas, limits of numerous shake holes are shown and the area described as area of shake holes);
- sluices – except those found in sewage works;
- stepping stones;
- taps (which take the form of drinking fountains or that form the communal water supply)†;
- tidal gauges;
- waterfalls – only if formed by natural features;
- water troughs (public)†;
- weirs;
- bollards, capstans and mooring posts;
- breakwaters and groynes;
- culverts;
- perches, pilot beacons and navigational beacons;
- pumps, wells, spouts, springs and fountains;
- drinking fountains†;
- swimming pools;
- watercress beds;
- issues;
- sinks; and
- springs.

† These features are no longer captured under current specification and will only be maintained through deletion.

Non-physical features shown in the water theme are:

- NTL – the point inland to which mean tides (or mean spring tides in Scotland) flow at high water. The point is shown and annotated by text;
- low water level (LWL) – the point to which mean tides (or mean spring tides in Scotland) flow at low water. The point is shown and annotated by text;
- the text descriptions of all water features; and
- flow arrows – a symbol used to indicate the direction of flow of non-tidal moving water.

Constraints imposed by survey principles

Rivers, streams and drains are shown at their true scale width or by a single line where their width is less than:

1.0 m	urban areas
2.0 m	rural and mountain and moorland areas

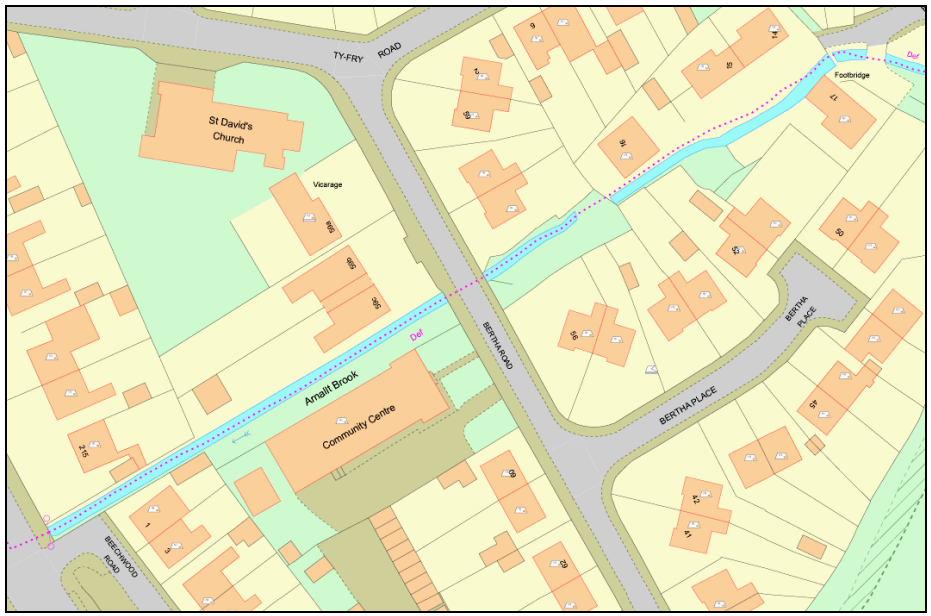
Chapter 1.5 Address Layer

Overview

The Address Layer in OS MasterMap provides the location of approximately 26 million residential and commercial postal addresses in Great Britain.

The Address Layer originates from Royal Mail's PAF. Ordnance Survey matches PAF addresses to their real-world location and represents this by coordinate values. When the address can be matched to a building feature then a reference between the building and the address is created.

Figure 1.5.1 Example of the Address Layer used with the Topography Layer



Addresses are subject to change from many causes, including property redevelopment, new construction and house/street name changes. The Address Layer provides a mechanism that assists users to track and manage these changes with respect to the actual building on the ground.

Potential uses

- incident analysis for emergency services;
- facilities planning for utilities;
- school catchment areas for local government;
- risk analysis for insurance, financial and environmental services;
- site location analysis for retailing; and
- address list cleaning.

The Address Layer establishes the link between PAF addresses and all other geographic information, including topography, transport networks, imagery, height, boundaries, land use, and any other source of information that has a geospatial context.

Benefits

Businesses involved in the provision of services to the doorstep, including gas, water, electricity and telecommunications, need to relate a customer/property to their support infrastructures in the street. The Address Layer assists customers in meeting these requirements. Utility providers are able to quickly identify customers affected by interrupted services through simple routines that correlate the faulty infrastructure with properties supported by those infrastructures.

The Address Layer enables a two-way communication between addresses and other geospatial information. For example, in a geographical information system (GIS), a customer can plot the location of addresses on an aerial image, or can ring-fence an area on the image and identify the addresses in that area in order to communicate with them.

The accuracy of address location is critical in providing efficient public services. Fire, ambulance and police services are able to instantly identify the location of an address to increase their response times in emergency situations.

Since the Address Layer is compatible with other layers in OS MasterMap, it is a powerful tool in managing insurance risk or in analysing environmental impacts of new engineering developments such as road building or the development of waste disposal sites.

OS MasterMap is the most powerful land and property management tool available covering all of Great Britain, coupling the precise location of PAF addresses and a unique referencing system for non-addressable properties.

From routing and scheduling in traffic management through to the provision of location-based services, the Address Layer defines the relationship between service and customer, and this can be used to save time and money.

General principles

PAF

The PAF contains postal address data for approximately 26 million Delivery Points. These Delivery Points may be premises that are shown on OS MasterMap such as buildings, or they might be features that do not form part of the Topography Layer specification such as PO Boxes, caravan parks, buildings under railway arches, temporary buildings and houseboats. All valid addresses in PAF, to which coordinates can be allocated, will be in the Address Layer.

Ordnance Survey do not change the content of PAF directly: feedback is sent to Royal Mail where discrepancies occur between PAF and the Topography Layer. These changes may take several months to be reflected in the Address Layer.

Address components

Each address within the Address Layer must contain the following information:

- postcode; and
- post town; and
- organisation name; or
- PO box number; or
- building name or number; or
- sub-building name or number.

This is the minimum information required by the Royal Mail in order to deliver post to an address.

There are five postcodes used by Royal Mail that are not included in Address. These are:

- GI for National Giro;
- BT for Northern Ireland;
- IM for the Isle of Man;
- JE for Jersey; and
- GY for Guernsey, Alderney and Sark.

Authorisation of names

In Great Britain, except in the case of certain administrative names, there is no national body responsible for the names and spellings of places appearing on official maps or documents.

Each administrative area (that is, district, borough, unitary authority) has a Street Names Authority and a Housing Numbering Authority. The record kept by these authorities, after agreement with Royal Mail, is the authoritative reference supported by an Act of Parliament.

Personal names

There are some occurrences of an occupant's personal name in the data, where this is the only form of address for the property. These are shown as on PAF and will appear contained in brackets.

Data Protection Act 1998

Ordnance Survey is responsible for including OS MasterMap and the Address Layer in its notification to the Information Commissioner.

This advice relates to the basic Address data. Customers who link additional data to the Address Layer will need to consider the requirements of the Act. Ordnance Survey strongly advises customers to contact the Commissioner where this is the case.

Representation of addresses

Organisation name

The organisation name is the business name given to a delivery point within a building or small group of buildings. For example:

TOURIST INFORMATION CENTRE, HIGH STREET

This field could also include entries for churches, public houses and libraries.

Department name

In a few organisations, department name is indicated because mail is received by subdivisions of the main organisation at distinct delivery points. For example:

ABC COMMUNICATIONS	Organisation name
MARKETING DEPARTMENT	Department name
LONDON ROAD	Thoroughfare

Post office box

A post office (PO) box is a non-geographic address assigned a number by Royal Mail. As these are non-geographic, and cannot be matched to the customers address, Ordnance Survey will match them to the delivery office from which they are delivered to the addressee.

It should be noted that using PO box postcodes within location-based searches will identify the position of the delivery office, not the addressee.

Sub-building name and/or number

The sub-building name and/or number are identifiers for subdivision of properties. For example:

FLAT 3	Sub-building name
POPLAR COURT	Building name
LONDON ROAD	Thoroughfare

NOTE: if the above address is styled 3 POPLAR COURT, all the text will be shown in the buildingName field and the subBuildingName and/or buildingNumber field will be empty. The building number will be shown in this field when it contains a range, decimal or non-numeric characters (see below).

Building names

The building name is a description applied to a single building or a small group of buildings, such as Highfield House. This also includes those building numbers that contain non-numeric characters, such as 44a.

Some descriptive names, when included with the rest of the address, are sufficient to identify the property uniquely and unambiguously and are included in the Address Layer with no further investigation, for example, MAGISTRATES COURT.

Descriptive names in brackets, following a distinctive name, will only be shown in the Address Layer when they are shown in this form in PAF. For example, RAILWAY TAVERN (PUBLIC HOUSE) or THE COURT ROYAL (HOTEL).

Descriptive names with or without numbering are captured if included in PAF.

Building numbers

The building number, or postal number, is a number given to a single building or a small group of buildings, thus identifying it from its neighbours, for example, 44 HIGH STREET.

Building numbers that contain a range, decimals or non-numeric characters do not appear in this field but will be found in the buildingName or the subBuildingName fields.

Dependent thoroughfare

In certain places, for example, town centres, there are named thoroughfares within other named thoroughfares, for example, parades of shops on a high street where different parades have their own identity. For example, KINGS PARADE, HIGH STREET and QUEENS PARADE, HIGH STREET.

Thoroughfare

A thoroughfare in the Address Layer is fundamentally a road, track or named access route on which there are Royal Mail delivery points, for example, HIGH STREET.

Double dependent locality

This is used to distinguish between similar or same thoroughfares within a dependant locality. For example, Millbrook Industrial Estate and Cranford Estate in this situation BRUNEL WAY, MILLBROOK INDUSTRIAL ESTATE, MILLBROOK, SOUTHAMPTON and BRUNEL WAY, CRANFORD ESTATE, MILLBROOK, SOUTHAMPTON.

Dependent locality

Dependent locality areas may define an area within a post town. These are only necessary for postal purposes where there are thoroughfares of the same name, to aid differentiation. For example, SHIRLEY and SWAYTHLING in the situation, HIGH STREET, SHIRLEY, SOUTHAMPTON and HIGH STREET, SWAYTHLING, SOUTHAMPTON.

Post town

The post town is the town or city in which is located the Royal Mail sorting office from which mail is delivered to its final recipient. There may be more than one, possibly several, sorting offices in a town or city.

Postcodes

A post code is an abbreviated form of address made up of combinations of between five and seven alphanumeric characters. These are used by Royal Mail to help with the automated sorting of mail. A postcode may cover between 1 and 100 addresses. The average number of addresses per postcode is 15.

There are two main components of a postcode:

- the outward code (also called outcode). The first two–four characters of the postcode constituting the postcode area and the postcode district. It is the part of the postcode that enables mail to be sent from the accepting office to the correct area for delivery; and
- the inward code (also called incode). The last three characters of the postcode constituting the postcode sector and the postcode unit. It is used to sort mail at the local delivery office. For example:

OUTWARD		INWARD	
NW	6	4	DP
			Unit
		Sector	
	District		
Area			

Address attributes

addressStatus

The importance of checking this attribute to establish address quality cannot be overemphasised. The known quality of the data is indicated by a combination of the contained attributes: structureType, positionalQuality, physicalStatus and matchStatus.

structureType

This is a simple structural classification of the topographic area referred to by this address point. It indicates that the topographic polygon referred to is a Permanent Building, Other Structure or of Unknown construction.

positionalQuality

This indicates whether an address location is in its Final or Provisional position. Final means that the address is located either inside the building that defines the addressed premises or in a position that cannot be improved because of the nature of the addressed structure, for example, a house boat. Provisional means the address may be a considerable distance from the addressed structure (usually less than 50 m, but may exceed 100 m).

physicalStatus

This indicates the real-world status of the structure to which the delivery point is linked. It will be Planned, Existing, Demolished or Unknown.

matchStatus

This indicates the quality of the matching between Ordnance Survey and PAF addresses as either Matched, Unmatched, Matched With Discrepancy (Unresolved) or Matched With Discrepancy (Referred).

Chapter 1.6 Imagery Layer

The OS MasterMap Imagery Layer adds a visualisation and contextual capability to the other vector data layers in OS MasterMap. It has many uses and applications in areas such as property insurance risk analysis, asset management, land use analysis, agricultural land use and crops inventory, vegetation cover, property management, planning applications, route planning and accessibility assessment; and location-based services.

Figure 1.6.1 Example of the Imagery Layer

As the use of geographic information and GIS spreads to a wider community of users, imagery has an important part to play with its powerful visualisation properties especially for users who are less familiar with map-based presentation.

In addition, it has the valuable ability to expose additional detail, including small, temporary or unmapped items such as road furniture, car park spaces, foliage, moored boats, or cleared development sites. Combined together these two properties are frequently useful for site evaluations, vegetation studies and environmental analysis without the need for costly site visits.

Ordnance Survey has set the specification and quality levels for the OS MasterMap Imagery Layer with the aim of providing a reliably consistent source of orthorectified aerial photography for general business use in Great Britain. Ordnance Survey plans to ultimately cover the whole of Great Britain with a target rolling renewal programme (three year for urban and rural, five year for mountain and moorland). The Imagery Layer will provide users of all but the most detailed applications with a consistent, seamless source of imagery data that integrates with other layers in the OS MasterMap family.

Our objective of a seamless layer is that the joins between the separate images that make up the Imagery Layer will be minimal, that it is colour balanced and edgematched such that analysis of information across image boundaries is not seriously hampered by misalignment or inconsistency.

Variations because of time of day differences (for example, lengthening shadows, colour changes), time of year differences (for example, vegetation changes, river levels) and age differences (for example new developments, road changes) mean that some variation is inevitable and an overzealous attempt at imposing an artificial evenness would be misleading. The successful integration of imagery that has been captured and processed by several suppliers has required some of the industry's best skills and a considerable investment in time and resources. The result is a product that has greatly increased utility and value through the levelling of many of those variations in colour, contrast and alignment ,which are a result of differences in process or technique in the original image capture and processing rather than substantial changes or natural variations on the ground.

Imagery is supplied to the customer in tiles that are 1 km by 1 km in 24-bit colour. Each image file is accompanied by an XML metadata file (see Image Metadata). It is sourced from air photography with a ground resolution of 25 cm. All of the imagery supplied is orthorectified using National Grid control or GPS data with a suitable transformation. The terrain model used is at or above the specification for the Ordnance Survey Land-Form PROFILE® product. Imagery flown before 1999 will not be used in the first release of the OS MasterMap Imagery Layer.

The objective is that the OS MasterMap Imagery Layer should be consistent in its quality across all of Great Britain to meet a set of standards in relation to:

- the image capture (to follow RICS 89, RICS 2001 or equivalent);
- film and camera;
- nominal photo scale;
- orthorectification procedures, including quality of the terrain model to be used;
- geometric accuracy;
- image appearance, including thresholds for cloud cover and artefacts within the image; and
- mosaicking, including quality of joins and colour balance.

Moving forward, Ordnance Survey recognises that advances in imagery technology and techniques should further enhance the standard of aerial imagery. The standards we have set for newer imagery (from January 2003 onward) therefore reflect those advances particularly in absolute and radiometric accuracy.

Image metadata

Metadata files are provided for each image file. These files contain the following information:

Metadata property	Value examples	Cardinality	Notes
copyright	Ordnance Survey, (c) Crown Copyright 2002.	1	
kmReference	SU3608	1	
dateFlown	2002-07-21	1..2	There will be one dateFlown element if the image was flown on a single day, or two dateFlown elements representing the first and last dates flown. Dates have the format of: CCYY-MM-DD.
kmRectangle	436000, 108000, 437000, 109000	1	Coordinates in metres
lensFocalLength	150.352	1..n	Millimetres
nominalFlyingHeight	1800	1..n	Metres
nominalImageScale	1:10 000	1..n	
nominalAbsoluteAccuracy	'1.1' or '4.0*'	1	RMSE in metres. *3.4 m applies to any imagery created from photography flown in areas of designated sparsely populated areas after 1 March 2004.
resolution	0.25	1	Metres
fileSize	46.877	1	Megabytes to 3 decimal places
control	'GPS and OSTN02®'	1	Choice of 'GPS and OSTN02', 'NG From Traditional Control' or 'Land-Line'.
createdBy	'Ordnance Survey'	1	Name of supplier
correctionType	'Orthorectified'	1	Fixed value

Where imagery has been merged from more than one source with different properties it is possible that small areas of imagery within a 1 kilometre square will not match the metadata values particularly in rural areas where variations are not significant. The files are encoded in XML according to an XML schema definition that is available at http://www.ordnancesurvey.co.uk/xml/schema/v3/OSImageMetadata.xsd. The geometry components make use of GML 2.1.2 geometry definitions as defined in Chapter 2.3 and Chapter 2.4. An example is outlined below:

```
<?xml version="1.0" encoding="UTF-8"?>
<osgb:OrthoImageMetadata xmlns:osgb="http://www.ordnancesurvey.co.uk/xml/namespaces/osgb"
xmlns:gml="http://www.opengis.net/gml" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.ordnancesurvey.co.uk/xml/namespaces/osgb OSOrthoMetadata.xsd">
   <osgb:copyright>Ordnance Survey, (c) Crown Copyright 2002.</osgb:copyright>
   <osgb:kmReference>SU4818</osgb:kmReference>
   <osgb:dateFlown>2001-08-21</osgb:dateFlown>
   <osgb:kmRectangle>
      <osgb:Rectangle srsName="osgb:BNG">
       <gml:coordinates>436000,108000 437000,109000</gml:coordinates>
      </osgb:Rectangle>
   </osgb:kmRectangle>
   <osgb:lensFocalLength uom="http://www.ordnancesurvey.co.uk/xml/resource/units.xml#millimetres">
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   </osgb:lensFocalLength>
   <osgb:nominalFlyingHeight uom="http://www.ordnancesurvey.co.uk/xml/resource/units.xml#metres">
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   <osgb:nominalImageScale>
      1:10000
   </osgb:nominalImageScale>
   <osgb:resolution uom="http://www.ordnancesurvey.co.uk/xml/resource/units.xml#metres">
      0.25
   </osgb:resolution>
   <osgb:fileSize uom="http://www.ordnancesurvey.co.uk/xml/resource/units.xml#MegaBytes">
      123.765
   </osgb:fileSize>
   <osgb:control>GPS and OSTN97</osgb:control>
   <osgb:createdBy>Ordnance Survey</osgb:createdBy>
   <osgb:correctionType>Orthorectified</osgb:correctionType>
</osgb:OrthoImageMetadata>
```

Chapter 1.7 ITN (Roads) Layer

Overview

The OS MasterMap ITN (Roads) theme is the first component of the OS MasterMap ITN Layer, which may ultimately include rail, water and pedestrian components.

It consists of a fully topologically structured link and node network representing the driveable roads of Great Britain. The network lines are in geometric sympathy with topographic detail.

Information about the factors that may influence a driver's choice of route is available as an optional theme. This is described as Road Routing Information and is only useful to those with access to the network data.

The product includes the following:

- road classifications;
- road names;
- types of road;
- motorway junctions;
- information potentially relevant to routing; and
- references to the intersecting topographic polygons.

Our intention is that the road network will be continually updated following update of OS MasterMap topography and the road routing information will be updated within six months of change occurring in the real world.

Potential uses

The data can be used in many ways with the appropriate software. It can be used either alone or combined with other products and customers own datasets. Possible uses include:

- Accident analysis
- Asset recording and inventory management
- Catchment area analysis
- Command and control
- Defect analysis
- Derivation of street gazetteers
- GIS analysis, indexing and mapping
- Highway planning and engineering
- In-vehicle navigation and guidance
- Locational referencing
- Logistics management
- Real-time traffic control
- Road and highway maintenance
- Road design
- Route planning
- Scheduling and delivery
- Site location
- Traffic management
- Vehicle tracking

Roads for inclusion

A road is defined as a metalled way driveable by an ordinary vehicle such as a family car, where metalling is defined as the systematic application of material to assist the passage of a vehicle.

Public and private roads are included in the data and the accessibility of any road section of road is indicated by combination of the attributes on the RoadLink and Road Routing Information.

All public roads will be in the data. In the first release of ITN (Roads) the coverage of private roads and alleys is limited to those present in previous Ordnance Survey roads products that have been reclassified.

Representation of the road network

Road names and numbers

Named and numbered roads are captured as Road features within the data. A Road feature represents a named or Department for Transport (DfT) numbered road, for example Romsey Road or the A38.

The feature includes information on the road type (named, motorway, A road or B road), the name or number and a set of references to the RoadLink features that provide the network topology of the road.

The road name is that collected by Ordnance Survey and ordinarily collected during a ground visit. DfT road numbers are based upon either a ground visit or information from the DfT.

The Road feature represents the named or numbered road therefore a section of road that has both a name and number will have two independent road features, one for the name and one for the DfT number. Any single RoadLink may be referenced by more than one road feature, though not usually by more than a single named or single numbered road. For example the A3057 and Romsey Road may both refer to at least some of the same links; however an individual link would not ordinarily be referenced by both the A3057 and the A35. The hierarchy for allocation where classified roads join is described below.

An exception to the above is for numbered roads that have sections classified as Primary Routes or Trunk Roads by the DfT.

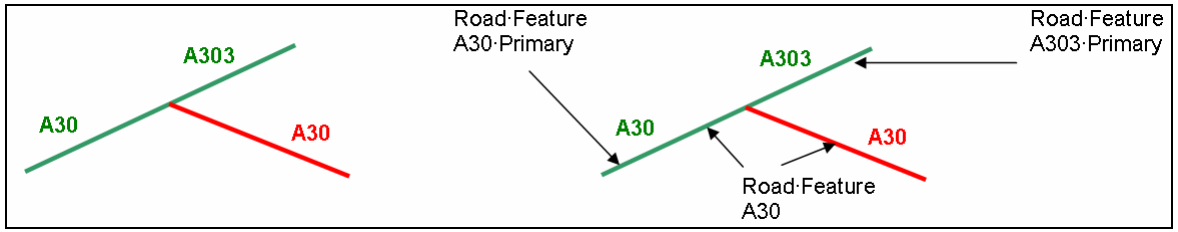
Unnamed and unnumbered roads are included as RoadLink features but are not referenced by a Road feature.

Numbered roads

Road features representing DfT numbered roads reference all of the RoadLink features that represent that classified road. These links may not be contiguous either across junctions and, where a classified road consists of separate sections, they may be separated by some considerable distance.

Trunk Roads and Primary Routes are captured as independent Road features that include an attribute that describes them appropriately. They reference only the links that represent their geometry. This results in two numbered road references to the same link(s), in this case the number will be the same but one feature will have an additional attribute describing it as a Trunk Road or Primary Route.

Example



In this example the A303 Primary Route joins the A30; the A30 then becomes a Primary Route.

Three features are required:

- the A30 representing all RoadLinks part of the A30;
- the A303 Primary representing all RoadLinks part of the A303 Primary Route; and
- the A30 Primary representing the subset of the A30 that is classified as a Primary Route.

Reference to RoadLinks by road features representing DfT numbered roads at roundabouts and junctions

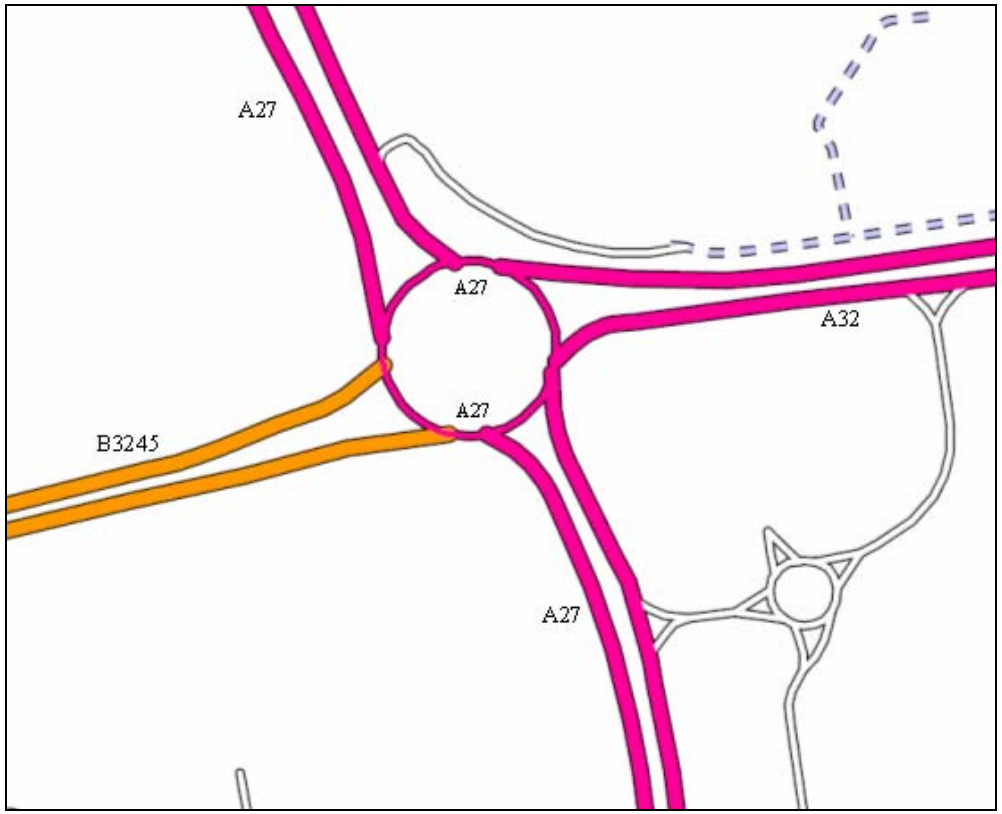
Any RoadLink may only be referenced by one DfT numbered Road feature (with the exception of Trunk Roads and Primary Routes as described above). The following priorities are used to determine how links are referenced at road junctions including roundabouts.

1 The road number that Ordnance Survey has information from DfT is applicable to the link.

2 If no information is available a hierarchy is imposed where the following priorities are applied: Motorway, A Trunk, A Primary Route, A Road, B Road.

Where two roads of equal magnitude meet, then the lower numbered route would be used. For example, the A1 Trunk would be preferred over the A11 Trunk.

Example: Numbered roads at a roundabout



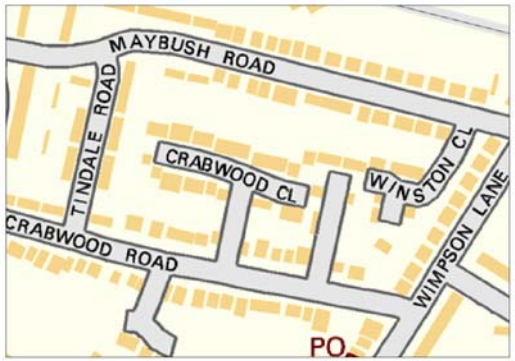
In this example, in the absence of other information, the A27 has priority over the A32 at the roundabout and the RoadLink features are referenced accordingly.

Named Roads

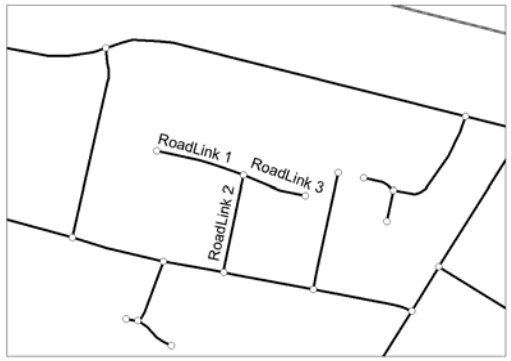
A Road feature is created for each named road. As there are many roads with the same name (for example, High Street), Road features reference all of the RoadLink features that represent the same named road within an area. To achieve this automatically a threshold is applied where a named road is not continuous (for example, at a junction) to identify other links that may be part of the same road.

In this way a Road feature is created referencing the links in an area that represent a single named road. On rare occasions RoadLink features representing the same named road, separated by a distance in excess of the set tolerance, may result in two Road features being created with the same name. Similarly it may be that two roads with the same name separated by less than the threshold may be created as a single feature.

Representation of roads by RoadLink features and Road features.



Example of the relationship between RoadLink features and Road features. Crabwood Close is represented by a Road feature that references RoadLink features number 1, 2 and 3.



Road feature
roadName – Crabwood Close
networkMember – 1, 2, 3

Reference to RoadLink features by Road features representing named roads at roundabouts and junctions

At a roundabout or road junction any RoadLink may only be referenced by one named Road feature. The following priorities are used to determine how links are referenced at road junctions, including roundabouts.

1 To reflect the real-world situation as far as possible.

2 Where no single named road extends either side of a roundabout then the roundabout RoadLinks will not be referenced by any of the named Road features.

3 If one of the named roads only extends either side of a roundabout, then the roundabout RoadLinks will be referenced by that named Road feature.

4 If more than one named road extends either side of a roundabout, then the named road that is coincident with any prioritised DfT numbered Road feature will refer to the roundabout RoadLink features.

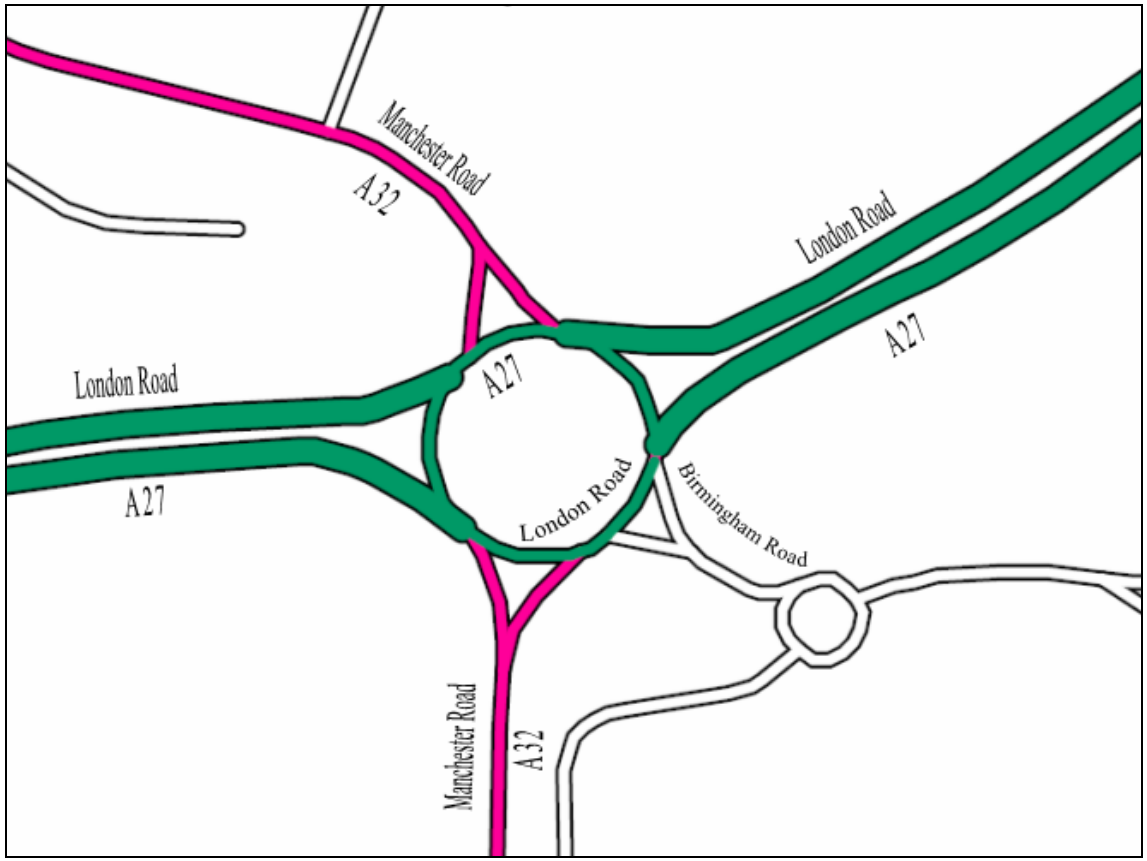
5 If more than one named road extends either side of a roundabout and no DfT road numbering hierarchy exists, then the RoadLink features may be referenced by one of the named Road features if it can be identified as having more significance.

6 If significance cannot be identified then the RoadLink features at a roundabout are not referenced by any Road feature.

Examples of named Road features at junctions and roundabouts are on the following pages.

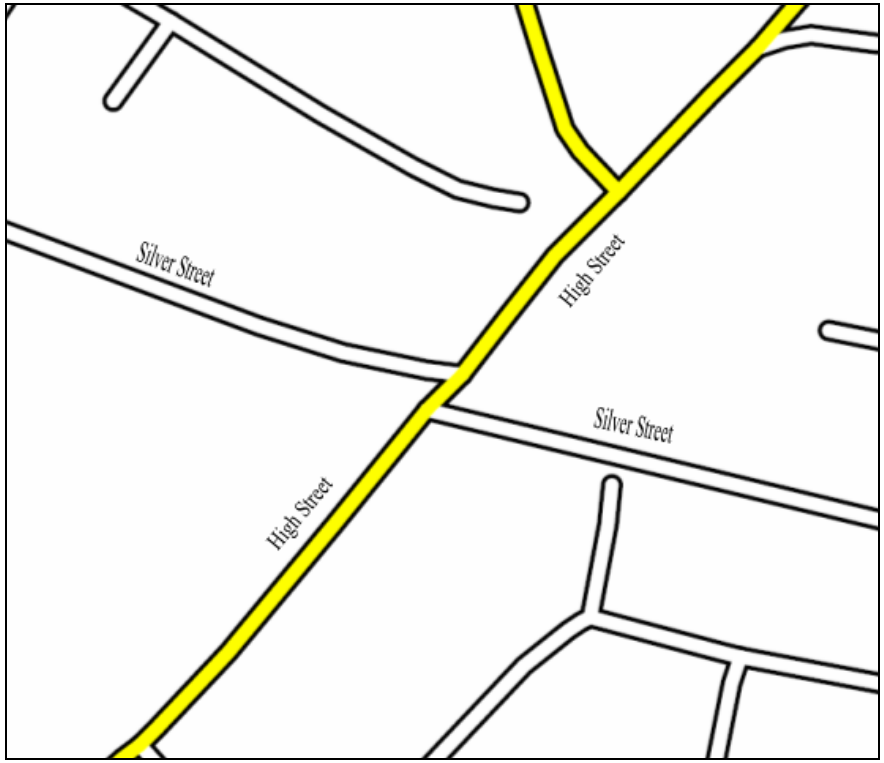
Named roads at a roundabouts

In this example only London Road extends either side of the roundabout. Therefore the roundabout RoadLink features are referenced by the London Road Road feature.



In this example both London Road and Manchester Road extend either side of the roundabout. However, London Road is coincident with the A27, which takes priority over the A32, therefore the roundabout RoadLink features are referenced by the London Road Road feature.

Named roads at a junctions



In this example High Street is identified as the continuous road and the RoadLink features will be allocated accordingly. Silver Street will be a single Road feature unless the distance exceeds the set tolerance.

Road geometry

The general alignment of the road carriageway is represented in the data by RoadLink features.

RoadLink features have information about the geometry of the link, the type of road the link represents, such as motorway, A road and so on, and information about the nature of the road the link represents, such as single carriageway, dual carriageway, slip road and so on.

Additionally, the length of the link and references to the node features at either end of the link are included. Grade separation information is included to indicate any restriction on accessibility from one link to another where they cross at bridges, flyovers and so on.

The geometry of RoadLink features will fall within the topographic polygons that represent the road carriageway and there is a reference from the RoadLink feature to the TopographicArea features it intersects.

Road intersections

The road network is broken only in specific circumstances and a RoadNode feature is added coincident with the end of all RoadLink features. The end of a RoadLink feature indicates one of the following situations:

- the intersection or crossing of carriageways (including bridges, flyovers, tunnels where there is no connectivity);
- the location where a road name or number changes;
- the location where a road name or number ceases to apply; or
- the start/end of a carriageway.

A RoadNode feature has a point geometry and a reference to the underlying topographic polygon.

Road junctions (Not populated in current release. Will be available from summer 2004)

Motorway junctions (only) are currently represented as a single point feature described as an InformationPoint feature. InformationPoint features include a representative location for the junction and textual details of the junction number and the roads that intersect at the junction.

No other junctions are currently captured as discrete features and it is likely that an improved modelling of junctions may be introduced in a future release.

Vehicular ferry routes (Not populated in current release. Will be available from summer 2004)

Vehicular ferry routes are indicated by a combination of features in the same way as the road network.

FerryLink

The existence of a vehicular ferry service is represented by a FerryLink. This feature does not have geometry itself but is a logical link between the locations where a ferry allows vehicles on and off the ferry. A FerryLink feature necessarily includes references to the FerryNode features that represent its start and finish point.

FerryNode

The ends of a FerryLink (this may indicate part of a ferry route for multi-stage services) are represented by a FerryNode. These features represent the general location of the end of a FerryLink and have a single point position.

A FerryNode feature may serve multiple FerryLink features if more than one destination is served from the same general location.

Because FerryLink features do not have geometry of their own they cannot intersect in the way RoadLink features do, therefore FerryNode features will only ever exist at a location where vehicles or people are permitted on and off the ferry.

FerryTerminal

The ferry and road networks are linked by a FerryTerminal feature which represents where a potential change of mode of transport occurs from a road vehicle to ferry or vice versa.

A FerryTerminal feature has no geometry but simply provides a logical link between the road and vehicular ferry networks.

Road Routing Information (RRI)

RRI is information about a route that may affect a driver's choice of route. It could be either restriction information, such as a prohibited turn, or advisory information, such as the presence of a ford.

Within ITN routing information is maintained as separate features from the base network these reference the underlying road network features (RoadLink or RoadNode features) to provide their location.

Simplification and priority of routing information features

Road routing information features attempt to record the effect and the nature of the real-world restriction or environmental factors. However this is not always possible as restrictions, in particular, may be manifest in many different ways yet have the same effect.

For example, a single restriction may consist of a one way street that has a no entry sign, no right/left turn signs and/or mandatory turn signs on the approach roads. This would be represented in the simplest way by recording a one way street. To ensure a level of consistency, a hierarchy is used when more than one restriction that has the same effect at a given location occurs. Only the restriction that has the highest priority will be captured.

Therefore RRI features primarily model the effect of any restriction in the simplest possible way and secondary to this is recording the real-world manifestation.

Restriction priority table

Priority	Restriction type
1	One-way
2	No Entry/Access Prohibited To/Access Limited To
3	Mandatory Turns
4	No Turn

Explicit and implicit drive restrictions

Explicit drive restrictions are those normally displayed on road signs or painted on the roadway, such as ‘Turn Right’, ‘Ahead Only’, ‘No Left Turn’ and so on.

Implicit drive restrictions are turns or changes of direction that are possible, but undesirable or dangerous, because of the position of traffic islands, road markings or lane indicators.

Both types of restriction are captured.

Representation of information captured – feature types

RRI features are captured as one of five types dependant upon whether they apply coincident with an intersection of network lines that affect a RoadLink regardless of direction of travel, along a RoadLink or link(s) in a specific direction, along part of a RoadLink or along part of a RoadLink in a specified direction.

Information coincident with RoadNode features

RRI features that occur coincident with intersections of the base network are captured as RoadNodeInformation features. Typical examples would be mini roundabouts or bridges with a height restriction where one road crosses another.

Height restrictions not coincident with RoadNode features are captured as described in the following section.

Information about a RoadLink where direction of travel is unimportant

RRI features that apply regardless of direction of travel to an entire RoadLink or at a point along a RoadLink are captured as RoadLinkInformation features. Typical examples that apply to an entire link could be access restrictions such as ‘no access for unauthorised vehicles’, ‘residents only’ or information such as the presence of traffic-calming measures.

Examples that apply to a specific location on a link regardless of direction of travel are level crossings, gates, fords and height restrictions not associated with a road bridge.

Where location along a link is relevant and available this is supplied as both National Grid coordinates and the distance along the link from its start point.

Information about a RoadLink or number of RoadLinks specific to a given direction of travel

RRI features that apply in a specific direction of travel to single or multiple RoadLink features are captured as RoadRouteInformation features.

Examples would be turn restrictions (which apply to multiple links such as no ‘U’ turn), one-way streets (which affect a single link in a specified direction) and access restrictions that apply in one direction only. Where location along a RoadLink is relevant and available this is supplied as both National Grid coordinates and the distance along the RoadLink feature from its start point.

Information about part of a RoadLink where direction of travel is unimportant

RRI features that apply regardless of direction of travel to a portion of a single RoadLink are captured as PartialRoadLinkInformation features.

An example could be an access restriction such as pedestrianised area that may be used by vehicles at specific times and only applies to a few hundred metres of a RoadLink feature

The start and finish points along the RoadLink feature are supplied as both National Grid coordinates and the distance along the RoadLink feature from its start point.

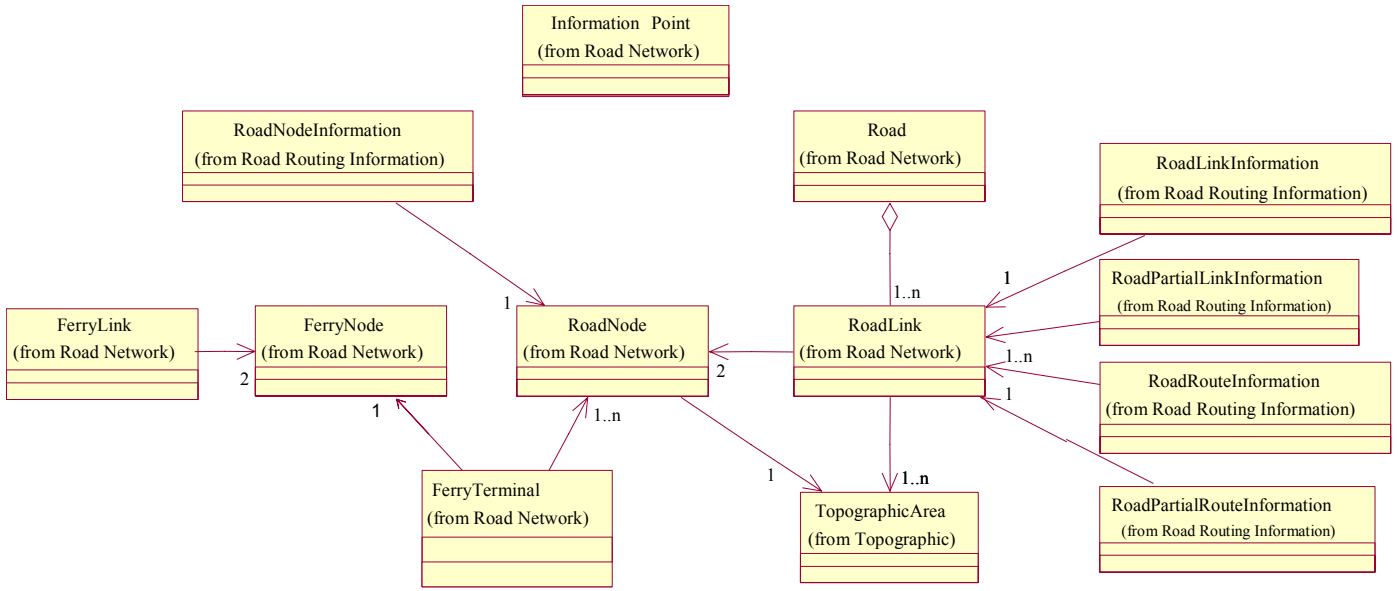
Information about part of a RoadLink specific to a given direction of travel

RRI features that apply to a specific direction of travel along to a portion of a single RoadLink are captured as PartialRoadRouteInformation features.

An example could be an access restriction such as a bus lane in one direction only or a one-way street that applies to a portion of a RoadLink feature.

The start and finish points along the RoadLink feature are supplied as both National Grid coordinates and the distance along the RoadLink feature from its start point.

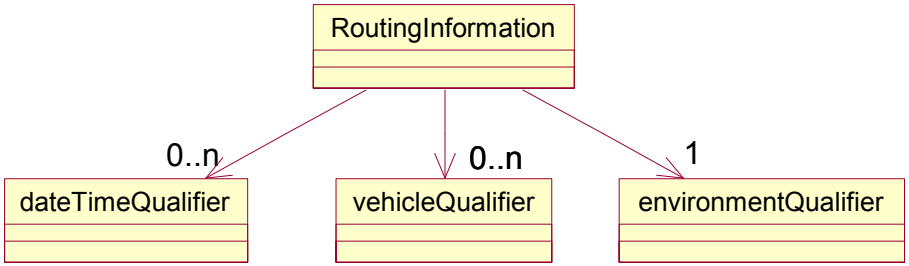
Relationships between ITN (Roads) features



Qualifiers

The nature and applicability of RRI features is supplied by the use of qualifiers on each RRI feature

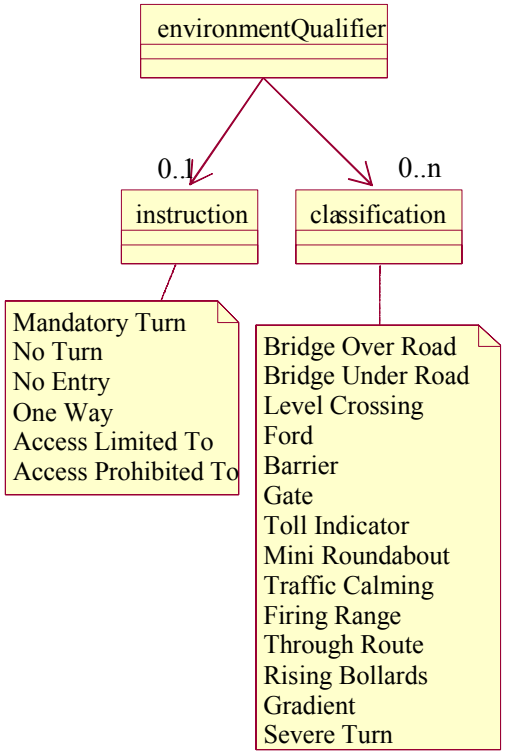
Routing information is divided into three main areas that provide information about what the information is, to whom it applies and when it is applicable. These are known as the date/time, vehicle and environment qualifiers.



- The nature of the RRI is recorded by the use of an environmentQualifier.
- To whom the RRI applies is defined by a vehicleQualifier.
- When the RRI applies is defined by a dateTimeQualifier.
- An environmentQualifier is always required.
- A dateTimeQualifier is optional and if not present then the routing information applies at all times.
- A vehicleQualifier is optional and if not present then the routing information applies to all vehicle types.

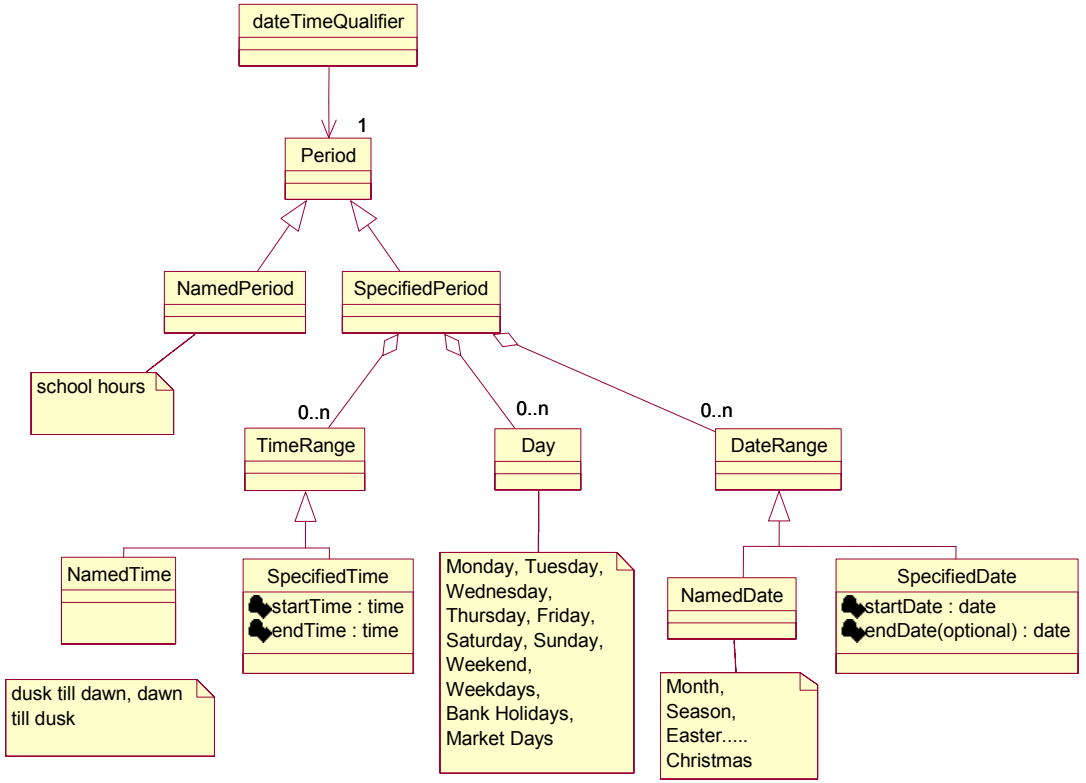
environmentQualifiers

The environment qualifier can provide either an instruction or classification. The diagram below shows the structure. It should be noted that the lists of instructions and classifications are only illustrative; the actual values are specified in the Reference section, OS MasterMap user guide, see Attribute values: instruction and Attribute values: classification.



dateTimeQualifier

A date/time qualifier specifies the date and/or time period that the routing information applies to. This may be through known named dates/times or specified dates/times. It should be noted that the lists of possible attributes are illustrative, the actual values are specified in the Reference section, OS MasterMap user guide, see Attribute values: dateTimeQualifier.

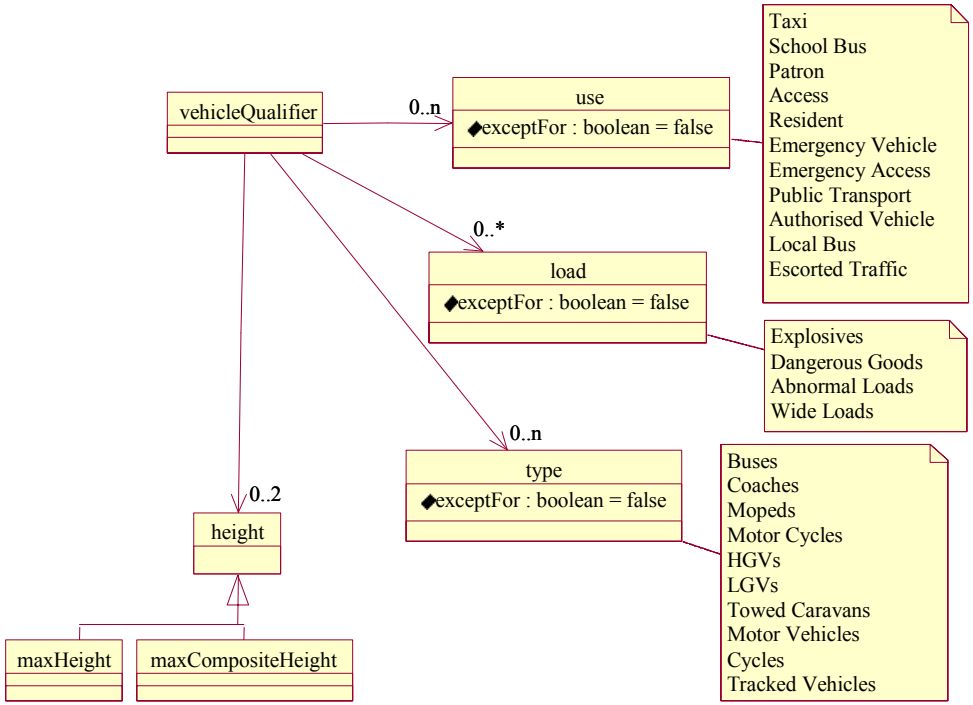


vehicleQualifiers

The vehicle qualifier indicates whether the instruction applies or does not apply to specific types of vehicle. The vehicle qualifiers currently describe a vehicle using use, load or type and height information.

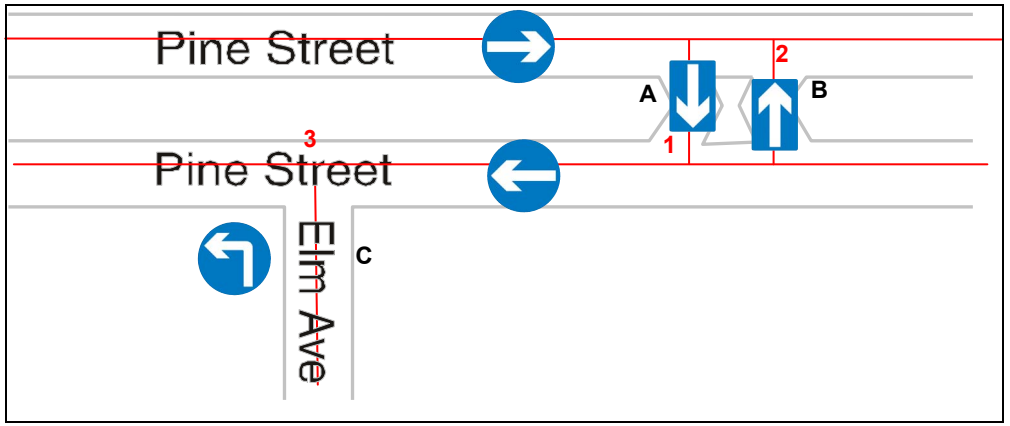
Where a vehicle type is an exception to the routing information it is identified by setting the exceptFor attribute to ‘true’.

The diagram below shows the structure. It should be noted that the lists of textual values are illustrative only and are specified in the Reference section, OS MasterMap user guide, see Attribute values:vehicleQualifier.



Examples of RRI features

One-way



Example: Dual carriageway with turning roads (A and B) and joining road (C). In this example Pine Street consists of two carriageways where traffic is only permitted in one direction on each carriageway.

In this example there will be a RoadRouteInformation feature for each of the RoadLink features that are one-way. The references to the RoadLink features specify the direction that the restriction applies in.

RoadRouteInformation attributes:

dateTimeQualifier

n/a

environmentQualifier

Instruction = One Way

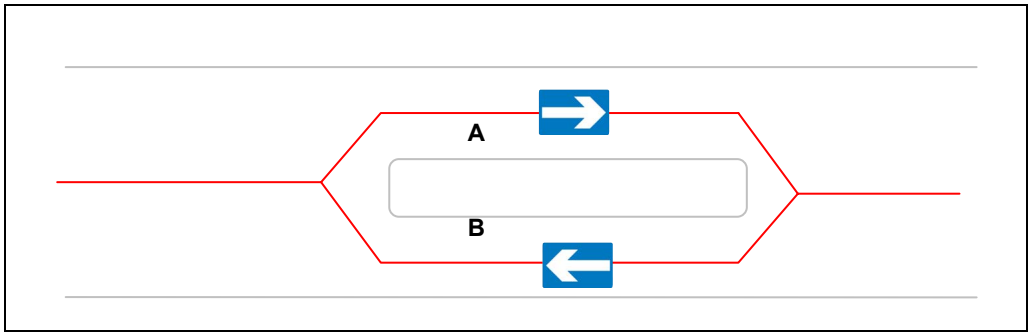
vehicleQualifier

n/a

The routing features are directed indicating the direction of the one-way route.

There is no requirement to capture any mandatory left-turn features at points 1, 2 or 3 because this information is already available by the presence of the one-way information on the links being joined.

Where a traffic island over 8 m² interrupts traffic flow at a junction of a road, the link is split, for example:



In this example there will be two RoadRouteInformation features to represent the one-way restrictions either side of the traffic island.

RoadRouteInformation attributes:

dateTimeQualifier

n/a

environmentQualifier

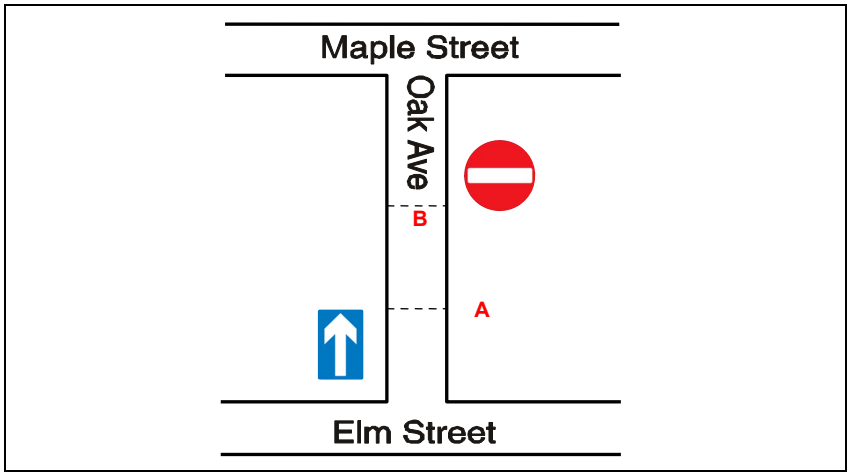
Instruction = One Way

vehicleQualifier

n/a

There is no turn restrictions to indicate that access from A to B and B to A may be impossible, undesirable or dangerous.

Partial One-way and time dependent No Entry



A single RoadLink may be subject to a one-way segment that only applies to part of the link.

RoadPartialRouteInformation attributes:

dateTimeQualifier

n/a

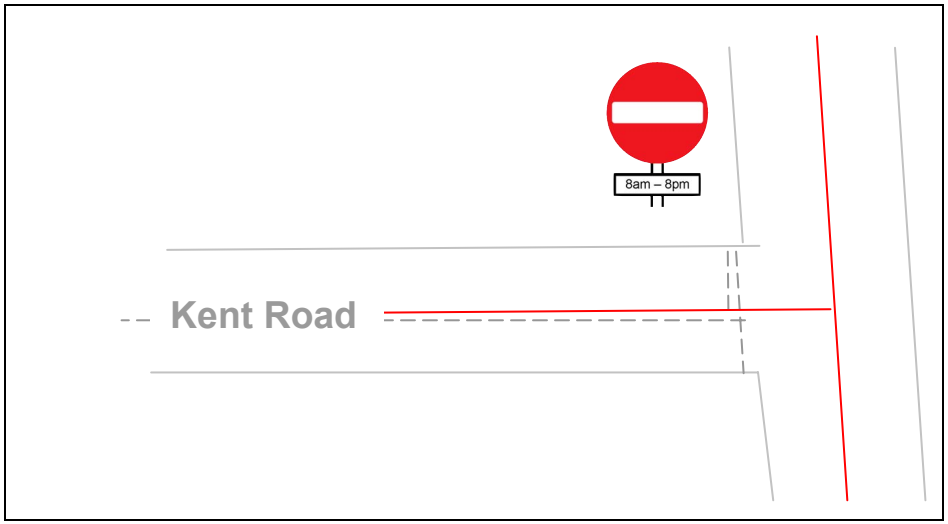
environmentQualifier

Instruction = One Way

vehicleQualifier

n/a

In this case the start location (A) and finish location (B) of the restriction along the RoadLink are supplied as part of the feature. The direction of the restriction is specified in the relationship to the RoadLink.



In this example there is a No Entry restriction into Kent Road between the hours of 8 am and 8 pm. Kent Road is **not** a one-way street.

RoadRouteInformation attributes:

dateTimeQualifier

specifiedTime

startTime = 08:00

endTime = 20:00

environmentQualifier

Instruction = No Entry

vehicleQualifier

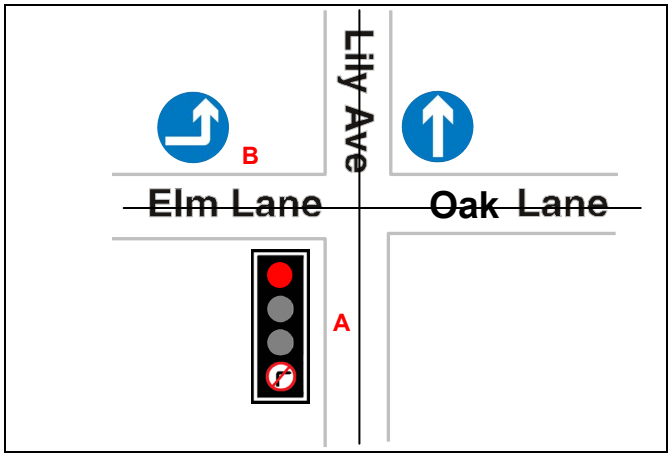
n/a

The RoadRouteInformation feature is directed indicating the end of the link the No Entry applies to.

Turn restrictions and mandatory turns

Turn information consists of mandatory turns or restricted turns. These are added when required because their effect is not supplied by traffic-flow restrictions, for example, one-way streets, or access restrictions such as no entries.

In this example there is a no right turn into Oak Lane (A) and traffic coming from Elm Lane must turn left into Lily Avenue (B).



RoadRouteInformation attributes for feature A:

dateTimeQualifier

n/a

environmentQualifier

Instruction = No Turn

vehicleQualifier

n/a

RoadRouteInformation attributes for feature B:

dateTimeQualifier

n/a

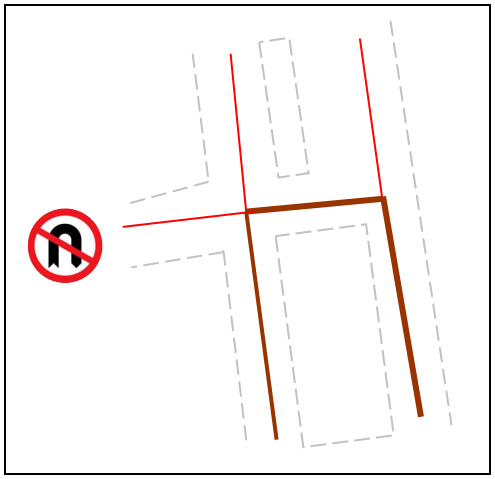
environmentQualifier

Instruction = Mandatory Turn

vehicleQualifier

n/a

The RoadLink features referred to are ordered and directed indicating the direction of the restriction.



Turn routing consisting of a No U Turn.

RRI attributes for no U turn information:

dateTimeQualifier

n/a

environmentQualifier

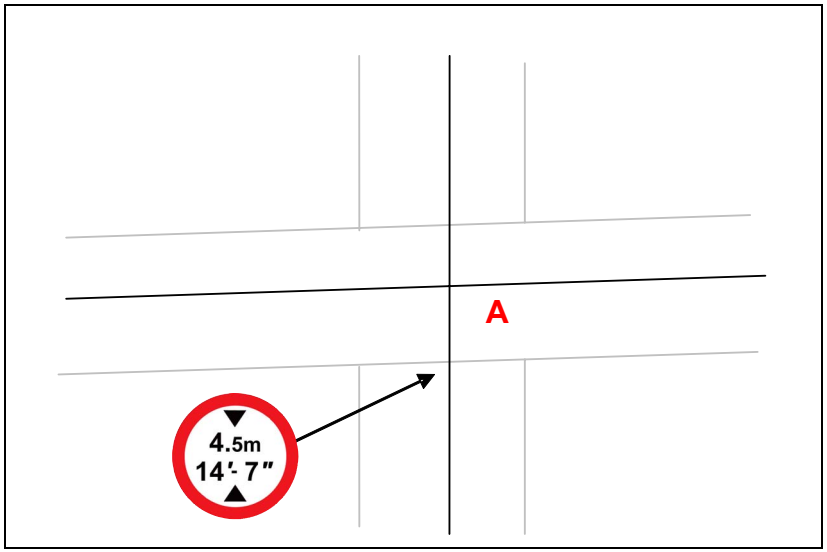
Instruction = No Turn

vehicleQualifier

n/a

This feature includes references to the three directed links highlighted in brown in the diagram.

RRI features at specific locations



Height restriction coincident with intersection of RoadLink features.

RoadNodeInformation attributes for feature low bridge at A:

dateTimeQualifier

n/a

environmentQualifier

classification = Bridge Over Road

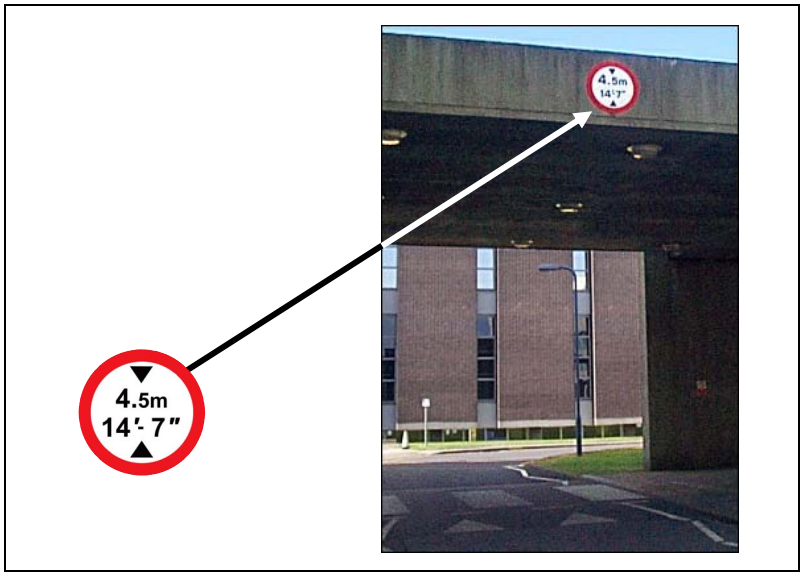
vehicleQualifier

maxHeight (uom = metres) = 4.5

maxCompositeHeight

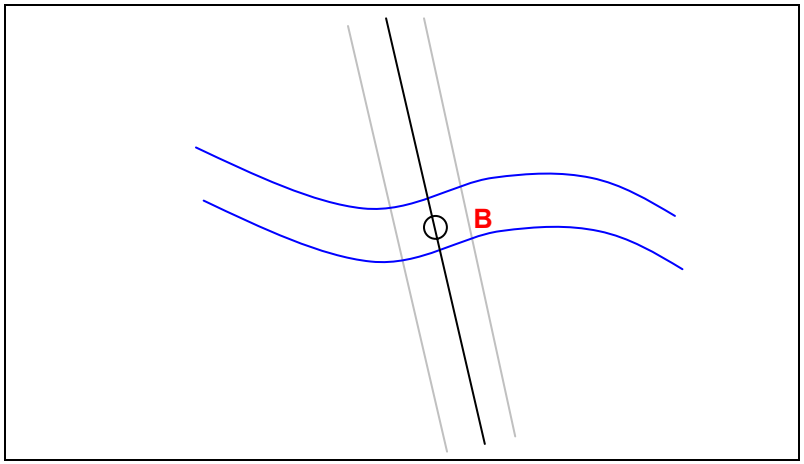
feet (uom = feet) = 14

inches (uom = inches) = 7



Height restriction enforced by a structure such as a railway bridge or footbridge.

RoadNodeInformation attributes for feature low bridge at A:
dateTimeQualifier
n/a
environmentQualifier
classification = Bridge Over Road
vehicleQualifier
maxHeight (uom = metres) = 4.5
maxCompositeHeight
feet (uom = feet) = 14
inches (uom = inches) = 7



In this example a road passes through a stream.

RoadLinkInformation attributes for feature at B:

dateTimeQualifier

n/a

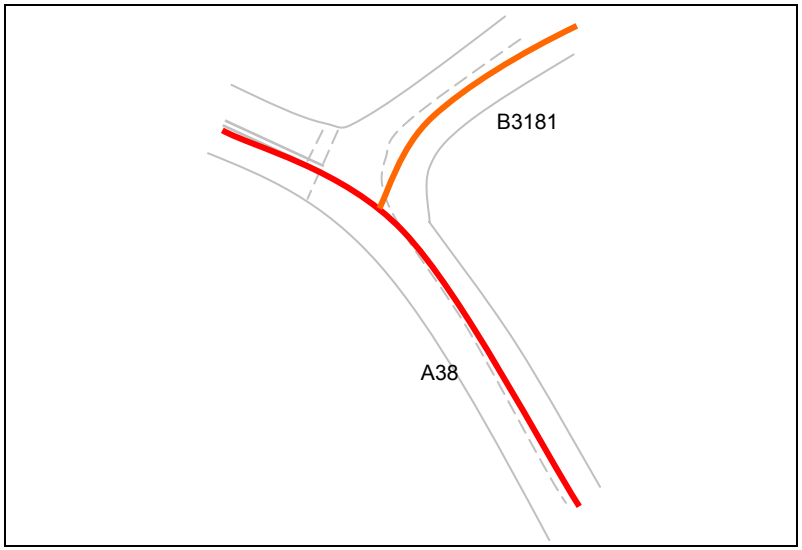
environmentQualifier

classification = Ford

vehicleQualifier

n/a

The distance along the link and the National Grid coordinates of the ford are given as part of the RoadLinkInformation feature.



Where the priority at a junction cannot be inferred either by the geometry or classification of the intersecting roads then RoadRouteInformation feature with an environmentQualifier classification of Through Route is captured. It is assumed that higher DfT classification roads have priority over lower classification roads.

In this example traffic can travel unhindered from the A38 onto the B3181 in both directions as indicated by the road markings.

RoadRouteInformation attributes for through route information:

dateTimeQualifier

n/a

environmentQualifier

classification = Through Route

vehicleQualifier

n/a

This feature includes references to the RoadLink features forming the through route.

Use of qualifiers and exceptions on Road Routing Information

Qualifiers are used to indicate if routing information applies to anything less than all vehicles at all times. The default in the absence of a vehicleQualifier or dateTimeQualifier is that the routing information applies to all vehicles at all times.

All RRI features have environment qualifiers to indicate the nature of the information. Where the information only applies at specific times a dateTimeQualifier is used. Where the use, type, load or vehicle height are relevant to the applicability of the information then a vehicleQualifer is used.

In some cases routing information specifically does not apply to certain vehicles. This is indicated by the use of an 'exceptFor' clause which if set to true indicates that the information does not apply to the specified class of vehicle use, type or load.

It should be noted that routing information is not necessarily restrictive, for example *Access Limited To* indicates the vehicles that can access a RoadLink as opposed to *Access Prohibited To* which indicates those vehicles that cannot.

- exceptFor clauses only apply to the use, type or load parts of a vehicleQualifier.
- exceptFor = false – this is the default, the routing information applies to the specified type(s) of vehicle only.
- exceptFor = true – the routing information does not apply to the specified type(s) of vehicle.

RRI with exceptions

In this example there is a pedestrian zone indicated by the 'No Motor Vehicles' sign that has time and vehicle type exemptions. It is assumed that the same restriction applies to traffic in either direction.

RoadLinkInformation attributes:

dateTimeQualifier

specifiedTime

startTime = 08:00

endTime = 18:00

environmentQualifier

instruction = Access Prohibited To

vehicleQualifier

type (exceptFor = True) = Buses

use (exceptFor = True) = Taxis

use (exceptFor = True) = Permit Holders

In this example only the specified vehicles are allowed access into a road. It is assumed that the same restriction applies to traffic in either direction.

RoadLinkInformation attributes:

dateTimeQualifier

n/a

environmentQualifier

instruction = Access Limited To

vehicleQualifier

type (exceptFor = False) = Buses

type (exceptFor = False) = Cycles

use (exceptFor = False) = Taxis

Further examples of RRI features with exceptions

No entry except for buses

The restriction here is ‘No Entry’ for all vehicles except buses.

dateTimeQualifier

n/a

environmentQualifier

instruction = No Entry

vehicleQualifier

type (exceptFor = True) = Buses

No access except emergency vehicles

The restriction is an ‘Access Prohibited To’ all vehicles except for the specified vehicles.

dateTimeQualifier

n/a

environmentQualifier

instruction = Access Prohibited To

vehicleQualifier

type (exceptFor = True) = Emergency Vehicles

No Motor Vehicles or motorcycles 8 am to 6 pm except buses, taxis and permit holders

The restriction is an ‘Access Prohibited To’ for the specified vehicles.

dateTimeQualifier

n/a

environmentQualifier

instruction = Access Prohibited To

vehicleQualifier

type (exceptFor = True) = Buses

use (exceptFor = True) = Taxis

use (exceptFor = True) = Permit Holders

One-way street for buses only

The restrictions here are one way and access limited to buses, two features are captured.

Feature one:
dateTimeQualifier
n/a
environmentQualifier
instruction = One Way
vehicleQualifier
n/a

Feature two:
dateTimeQualifier
n/a
environmentQualifier
instruction = Access Limited To
vehicleQualifier
type (exceptFor = False) = Buses

Note the vehicleQualifier for the Access Limited To has the exception set to ‘false’ to indicate that it applies to ‘Buses’ as a vehicle type only. In this example all other vehicles are not subject to the restriction, therefore it is inferred that there is no access to any vehicles other than those specified (buses).

Permit holders only

The restriction is ‘Access Limited To’ permit holders.

dateTimeQualifier

n/a

environmentQualifier

instruction = Access Limited To

vehicleQualifier

type (exceptFor = False) = Permit Holders

Note the vehicleQualifier for the Access Limited To has the exception set to ‘false’ to indicate it applies to ‘Permit Holders’ as a vehicle use only. In this example all other vehicles are not subject to the restriction, therefore it is inferred that there is no access to any vehicles other than those specified (permit holders).

Chapter 1.8 Life cycles of OS MasterMap features

Introduction

Purpose

This chapter sets out the rules that define the life cycles of topographic, Address and ITN (Roads) features in OS MasterMap. Essentially, these rules indicate when an OS MasterMap feature should be retained and when it should be replaced, for different types of features and different change scenarios. This is derived from a larger document, which details the requirements of Ordnance Survey editing systems and working practices of Ordnance Survey data collectors to implement OS MasterMap feature life cycles.

Because ITN (Roads) features are significantly different from topographic and to a lesser extent Address features their life cycles are described separately.

Feature life cycles

Real-world objects have life cycles. For example: a building is constructed; it may be extended, and is eventually demolished.

OS MasterMap features also have life cycles. For example: a new building, Address or ITN (Roads) feature will be created in the data; it may be modified one or more times, and eventually it may be deleted.

OS MasterMap TOIDs do not have life cycles. A TOID is the unique number that identifies a feature. It is assigned when the feature is created and is never reassigned to a different feature. A TOID does not itself have any geometric or other attributes; those belong to the feature it identifies.

The life cycle of an OS MasterMap feature is closely linked to the real-world object life cycle. However, not all changes to the real-world object will be reflected in changes to the feature. For example, the addition of a new porch to a house might be considered too insignificant for Ordnance Survey data capture.

Different users with different applications think of feature life cycles in different ways. For some, any change to the geometry or classification of a feature means that the feature is no longer the same feature for their application. For others, the requirement is for persistence of features – so a feature continues to exist through extensive modification.

After consultation with users, we have adopted the approach of allowing features to persist through changes so far as is reasonable. We also provide a feature version number, which, when used with the TOID, provides a unique reference to a particular version of a changing feature.

There is inevitably some degree of subjectivity involved in judging that a real-world object, Address or ITN (Roads) feature has changed so much it can no longer be considered the same object, and therefore the OS MasterMap feature(s) representing it should be deleted and replaced. In the case of ITN (Roads) features topological structuring required to make the data useful can significantly impinge on the ability to logically preserve features. This document details the rules we apply to reduce this subjectivity as much as possible.

The purpose of TOIDs

OS MasterMap TOIDs have several purposes:

- TOIDs are designed to allow the association of data pertaining to real-world objects, thus reducing the need for multiple parties to capture and maintain feature geometry and facilitating sharing of information between OS MasterMap users.
- TOIDs are also used to refer to one OS MasterMap feature from another. For instance, the boundary of an OS MasterMap area feature in topological polygon data is specified by a chain of line feature TOID references.
- TOIDs are used to inform the user of modified and departed features in change-only data update.
- Sets of TOIDs can be used as complex features: representing schools; factories; road junctions; or individual properties comprising a house, its garage and garden.

The potential power of the TOID is dependent upon the consistency with which the relationship between the perceived life cycle of real-world objects can be mapped to the life cycle of the feature.

Definition of terms

Address

A feature stored in the database that represents a Royal Mail postal address.

deletion

The removal of a feature from the Ordnance Survey database.

descriptive group

The feature attribute that classifies the feature into a category such as Building or Landform.

feature

The item stored in the database that represents a real-world object, part of a real-world object, or several real-world objects.

real-world object

A physical building, road, area of land, or other topographic entity.

TOID

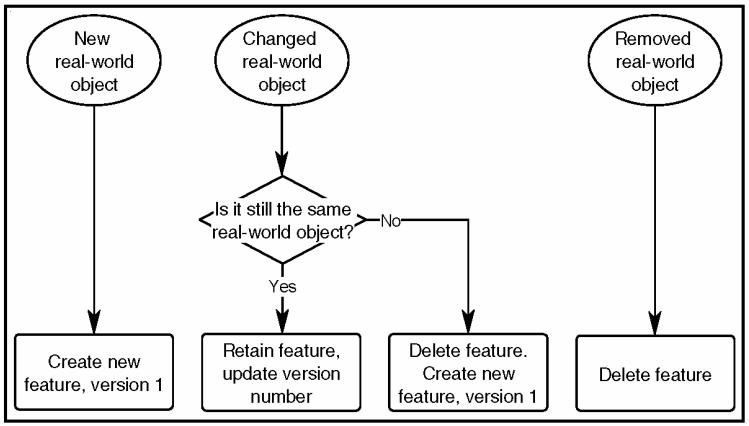
The unique integer allocated to a feature.

version

Each change to the feature will be identified by an increase in version number and a change to the versionDate. This ensures that users can be sure that they are referring to the same version of a feature.

Area feature life cycle rules

The flowchart below shows the process followed whenever a real-world object represented as an OS MasterMap area feature appears, changes or is removed from the landscape. The rules are described in more detail in the following sections, especially the guidelines we use to answer the question in the centre of the flowchart.



Creation of area features due to real-world change

When a new real-world object represented as an area feature – such as a pond, a building or a land parcel – comes into being, a new area feature is created in the data, with a new TOID and a version number. Users with local holdings of OS MasterMap data will be informed of new features in their holding via change-only data update.

Deletion of area features due to real-world change

When a real-world object represented as an area feature no longer exists in the real world, the area feature is deleted from the database. A record is kept in the database to indicate that a feature with this TOID used to exist. Users with local holdings of OS MasterMap data are informed of the deletion in their next change-only data update.

Modification of area features due to real-world change

When a real-world object represented as an area feature changes, but is considered to be still the same real-world object, the corresponding modified feature is retained in the database. The version number is incremented and the date on which the new version became current is stored.

If, however, the real-world object has undergone change such that it is not considered to be the same object as before, the area feature representing it is deleted and one or more new features created.

Alterations due to positional accuracy improvement (PAI) or any other error correction of Ordnance Survey data that is not related to real-world change are treated as detailed in Modification of line features due to error correction, later in this chapter.

Changes to geometry of area features

When a real-world area object expands or contracts due to alteration to its boundaries, yet is considered to be the same real-world object, the corresponding feature is retained with unchanged TOID. For instance, the area feature representing the back garden of a residential property is retained, even if it is greatly reduced or increased in size. This is because its identity as the representation of the garden of a particular property means it can be considered the same feature despite extensive changes to its geometry.

If it is not clear whether the real-world object after modification is the same object or a new one, the following considerations are used as a guideline:

- Is there topographic information to suggest the function of the resultant real-world object is the same as that of the original?
- Is the resultant real-world object more than half the size and less than twice the size of the original?
- Does the majority of the extent of the resultant real-world object lie within the bounds of the original?
- Is the resultant real-world object the obvious logical successor to the original?

If the continuation of the feature cannot be justified on one or more of these grounds, the feature is deleted and replaced with a new feature.

Examples

1 A private house is extended. The building and garden features are retained.

2 A field changes shape and reduces in size due to the realignment of one of its boundary fences alongside a road. The field feature and the adjacent road features are retained.

Splitting of area features

When a real-world area object is split into two or more separate real-world objects, one of the features may be clearly recognisable as the original real-world object. If this is the case, then the feature is retained.

If it is not clear whether one of the resultant features represents the same real-world object as the original feature then the following considerations are used as a guideline:

- Is the function of one of the resultant real-world objects the same as the original?
- Is one of the resultant real-world objects the obvious logical successor to the original?
- Does one of the resultant real-world objects occupy more than half the area of the original?

If the continuation of the feature cannot be justified on one or more of these grounds, the original feature is deleted and replaced with new features.

Examples

1 A new housing development is completed within an agricultural field. Part of the field remains and continues to be used for agriculture. The feature representing the rump of the field is recognisable as the original and has the same function, therefore it is retained. New area features are created to represent the new development.

2 An agricultural field is subdivided into three approximately equal parts that continue to be in similar usage. Using the guidelines above, none of the fields can be considered the obvious successor to the same as the original field: all have an area less than half of the original, therefore new features are created for all.

3 A house is built within a field. A new feature is created to represent the house. The feature representing the field is retained.

4 A house is divided equally in two by an externally surveyable division. No other changes take place. The original feature is deleted and new features created. This is because neither of the resultant houses is the obvious successor to the original.

5 A large agricultural building is split into two by the addition of an externally surveyable division enclosing approximately 25% of the original area. The original feature is retained to represent the larger part, and a new feature is created to represent the smaller part.

6 Most of the large garden of a residential property is sold off for development. The garden feature is retained to represent the much reduced garden.

Joining of area features

When two or more real-world area objects are merged by the removal of physical boundaries, it may be that one of the original real-world objects is clearly recognisable as subsuming the other(s). If that is the case the feature representing the dominant real-world object is retained and the other feature(s) deleted.

If one of the original real-world objects is not clearly dominant, the following considerations are used as a guideline to determine whether a feature is retained.

- Is the function of the resultant real-world object the same as one of the originals?
- Can one of the original real-world objects be considered the obvious predecessor to the resultant real-world object?
- Is the area of the resultant real-world object less than twice that of one of the original real-world objects?

If the continuation of the feature cannot be justified on one or more of these grounds, all the original features are deleted and replaced with new features.

Examples

1 Two fields, one of which is larger than the other, are merged into one, such that the resultant real-world object is recognisable as the larger field subsuming the smaller field. The feature representing the larger field is retained. The smaller field feature is deleted.

2 Three fields, which are broadly similar in size, are merged into one, such that none of the original fields are recognisable as the obvious predecessor of the resultant field. The original features are deleted and a new feature is created to represent the field.

3 A small pond within a field is filled in. The feature representing the pond is deleted and the field feature is retained.

4 Two semi-detached cottages of equal size are combined into one dwelling, with no alteration to the external geometry of the building. Both of the original features are deleted and a new feature is created.

5 A large greenhouse lies within a parcel of land only marginally larger than itself. The greenhouse is demolished. The feature representing the greenhouse is deleted, and the feature representing the land parcel is deleted as it has increased significantly and can no longer be seen as the same object.

Change of area feature classification

When a real-world object represented by an area feature changes such that the descriptive group or descriptive term of the feature changes, then the feature is usually retained, unless changes to its geometry indicate deletion of the feature under the guidelines above. For full information on these feature attributes, see the Reference section, OS MasterMap user guide.

Alterations due to PAI or any other error correction not linked to real-world change are treated as detailed in Modification of line features due to error correction, later in this chapter.

Examples

1 An area of agricultural land is wholly planted with trees; there are no changes to its bounding features. The descriptiveGroup of the feature changes but its geometry is unchanged. The feature is retained.

2 An area of woodland is felled and the area now consists of rough grass and scrub. The feature is retained.

3 A barn is converted into a private dwelling. There is no change to the classification attributes of the feature, and the feature is retained.

Modification of area features due to error correction

When an area feature is changed solely to correct errors either in geometry or other attributes, then the feature is retained.

If the feature has been moved to correct an error and simultaneously modified for real-world change, then the feature modification rules above are followed.

Examples

1 A line feature representing an old fence is found to have an error in its position and is corrected. The line feature and the area features bounded by it are retained. The version numbers of the features involved are incremented.

2 The feature representing an area of road has been assigned an incorrect descriptive group. The feature is reclassified and retained. The feature version number is incremented.

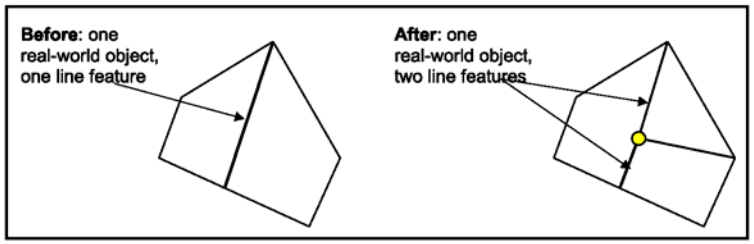
3 An area of non-coniferous trees has been incorrectly assigned the descriptive term coniferous trees by photogrammetric revision techniques. The feature is reclassified and retained. The feature version number is incremented.

4 A building foundation captured as a feature with descriptive group unclassified is completed, and the feature is reclassified to descriptive group building. The feature is retained. The feature version number is incremented.

Line feature life cycle rules

Line features in OS MasterMap are not persistent in the manner of area and point features. This is because line features are maintained by topological structuring rules. If a line feature is intersected by another line, it is broken at the intersection. This means that a single linear real-world object is often represented by several line features. There is no concept in OS MasterMap of a line feature that is made up of multiple line geometry elements. This limitation has significant impacts, making life cycles of line features difficult to manage. For example:

A fence cuts a field in two. A new fence is built at right angles to the original to further divide one half of the field. Although the old fence has not changed at all, it will be split into two separate line features:



Because there is no recorded relationship between OS MasterMap line features and particular, discrete real-world objects, any change to a line feature may result in deletion or significant modification of that feature and creation of new line features. This change is not necessarily caused by real-world change to the linear object represented by the feature. In the example above the original line feature is retained as one of the resultant line features; the other line feature is new. The user cannot predict which of the resultant line features will bear the original TOID.

This means that associating user data with OS MasterMap line features by TOID references is rarely advisable. The major exception to this is that when the reasonForChange is a correction of error rather than real-world change, then features are retained whenever possible.

Creation of line features

When a new linear real-world object comes into being, a new line feature is created to represent it.

Deletion of line features

When a real-world object is no longer present in the real world, the corresponding line feature is deleted from the database. A record is kept in the database to indicate that a feature with this TOID used to exist.

Modification of line features due to real-world change

As noted above, a line feature may be modified due to changes to the real-world object, or due to changes in adjacent real-world objects. The original feature may be retained if a portion of its geometry remains, and one or more new features may be created to reflect the change. If the classification attributes of a line change, then it will usually be retained.

Modification of line features due to error correction

When a line feature is changed solely to correct a surveying or cartographic error, the feature is retained, unless topological changes make this impossible.

Point feature life cycle rules

The life cycles of point features are simpler than those of lines or areas, since they cannot change in size or split into multiple features.

Creation of point features

When a new real-world object represented as a point feature comes into being, a new point feature is created to represent it. If, however, the object is a replacement for a previous real-world object in the same position the original feature is retained.

Deletion of point features

When a real-world object is no longer present in the real world, the point feature is removed from the database. A record is kept in the database to indicate that the feature with this TOID used to exist.

Modification of point features due to real-world change

By the nature of the real-world objects represented as point features in OS MasterMap data, it is unlikely that one will be modified without changing its identity. Therefore, any modification to a point feature as a result of real-world change will result in the deletion of the original feature and creation of a new feature, unless there is a clear reason to identify the resultant real-world object with the original. This applies to both geometric change and change of descriptive group or descriptive term.

Modification of point features due to error correction

When a point feature is found to be incorrectly attributed due to an error, or is moved due to the correction of a positional accuracy error, the original feature is retained, appropriately modified and with an incremented version number.

Address feature lifecycle rules

Creation of AddressPoint features

The Royal Mail creates new addresses within the PAF, update of which is supplied monthly to Ordnance Survey. Following processing into Ordnance Survey systems a new AddressPoint feature is created in OS MasterMap. This feature will be automatically matched to an approximate position based upon the correlation between its postcode and other AddressPoint features with similar or identical postcodes.

In time the match may be improved by Ordnance Survey to a more accurate position – this would be classified as a modification of an existing AddressPoint feature.

Deletion of AddressPoint features

When the Royal Mail decides that an address no longer receives mail it is deleted from the PAF, update of which is supplied monthly to Ordnance Survey. Following processing, the corresponding AddressPoint feature in OS MasterMap is removed from the database. A record is kept in the database to indicate that a feature with this TOID used to exist which is used to supply departed feature information in change-only update.

Modification of AddressPoint features due to real-world change

When the Royal Mail changes a PAF address, such as amending some of the address details, this is included in the monthly PAF update received by Ordnance Survey. Ordnance Survey may change a feature by improving the match location or identifying a potential discrepancy. In either of these cases the AddressPoint feature is updated and given an incremented version number and the date on which the new version became current is supplied by the versionDate attribute.

Modification of AddressPoint features due to error correction

Error corrections are treated in the same way as modifications of features due to real-world change.

ITN (Roads) feature life cycle rules

Creation of ITN (Roads) features

When a new ITN (Roads) real-world object comes into being, a new ITN (Roads) feature is created in the database to represent it.

Deletion of ITN (Roads) features

When an ITN (Roads) real-world object is no longer present, the ITN (Roads) feature is removed from the database. A record is kept in the database to indicate that the feature with this TOID used to exist.

Modification of ITN (Roads) features due to real-world change

When an ITN (Roads) real-world object changes but is considered to still be the same feature, the corresponding modified feature is retained in the database. The version number is incremented, and the date on which the new version became current is stored.

Where the real-world object changes so significantly that it cannot be considered to be the same real-world object, then the original feature is deleted and a new one created.

In the case of ITN (Roads) features it may be that real-world change has required a topological restructuring, which means that features have to be split, with at least one new feature that was part of an original feature being created.

Modification of ITN (Roads) features due to error correction

When an ITN (Roads) feature is found to be incorrectly attributed due to an error, or is moved due to the correction of a positional error, the original feature is retained, appropriately modified and with an incremented version number.

Examples of the life cycle rules as applied to ITN (Roads) features

ITN (Roads) features follow the same general guidelines as other OS MasterMap features. The examples below highlight where due to the nature of the real-world object they represent or the way the data is structured a different approach is followed.

Road features

These will generally persist as named or numbered roads, only rarely will they completely cease to exist in the real world.

1 The addition or subtraction of component RoadLink features or other change of attribution will result in the Road feature persisting and its version increasing.

2 If RoadLink features referenced by a Road feature are altered (but not deleted) the feature will persist without an increase in version.

3 A renamed Road feature or part of a Road feature will be created as a new feature; any portion of the original road will persist with a new version.

RoadLink

RoadLink features do not have a definitive relationship to the real world for some users they represent simply a connection between two points whose geometry is irrelevant, for others they represent a specific section of a road that no longer exists if a degree of change occurs.

1 Where a RoadLink feature is shortened or lengthened it should persist - the version will increase.

2 A RoadLink feature that has its alignment changed (for example, highway improvements) should persist where possible – the version will increase.

3 Where any change of attributes alone has occurred the feature should persist – the version will increase.

4 Change of road name or number alone will not result in update to RoadLink features because this information is stored on the Road feature.

Changes in topology:

1 Where a RoadLink feature is split through structuring of another RoadLink feature or addition of a RoadNode feature the resultant feature with the greatest length will retain the original TOID and have its version increased. The smaller section(s) will be created as new RoadLink feature(s).

2 Where a RoadLink feature is merged by removal of either a joining RoadLink feature or a RoadNode feature then the longest original RoadLink feature will persist with an increased version.

RoadNode

A RoadNode feature that is moved and represents broadly the same intersection of RoadLink features should persist and the version increase.

Changes in topology:

1 A RoadNode feature that has additional RoadLink features joined to it will persist with an increased version.

2 A RoadNode feature that has RoadLink features removed from it will persist provided it is still required to represent either the intersection of two or more RoadLink features, a change/end of road name or the end of a RoadLink feature. The version will increase.

InformationPoint

InformationPoint features are relatively robust and will only very occasionally cease to exist.

1 A changed motorway junction number will result in a new feature being created.

2 If the intersecting roads change then the InformationPoint feature will be retained with a new version.

FerryLink and FerryNode

FerryLink and FerryNode features have a simple relationship to the real world in that they represent either ferry route or the start/end of a ferry route. In general they are simply created or deleted.

1 If a FerryLink feature or FerryNode feature previously deleted is subsequently reinstated it would be captured as a new feature.

Changes in topology:

1 A FerryNode feature that has a FerryTerminal feature or FerryLink feature linked to it will persist with an increased version.

2 A FerryNode feature that has FerryTerminal feature or FerryLink feature removed from it will persist provided it is still required to represent the end of a one or more FerryLink features. If the feature persists the version will increase.

FerryTerminal

FerryTerminal features represent the interchange between networks. They generally persist unless the interchange they represent no longer exists.

Topology

Where a FerryTerminal feature has referenceToNetwork attributes changed to reflect additional or reduced references it will be retained and have its version increased.

Routing information

RRI features have a complex relationship to the real world and ITN (Roads) features can only make a very limited attempt to model this relationship.

In general, changes to road routing features will result in the deletion of any existing feature and the creation of a new one except in the circumstances outlined below.

Changes to an existing feature, for example, to the dateTimeQualifier, which does not involve addition or subtraction of RoadLink references for the feature should be retained with a new version.

Any real-world change to RoadRouteInformation features that involve addition or removal of RoadLink feature references will retain the feature only if the first and last RoadLink features are the same as the original feature. Otherwise a feature will be deleted and a new one created.

Chapter 1.9 Guide to using the OS MasterMap data selector

The OS MasterMap data selector is an online service provided by Ordnance Survey that allows account customers to:

- create and save estimates for OS MasterMap data;
- view estimates and convert to contracts online;
- view contracts for OS MasterMap data that have been converted from estimates online or off-line;
- place orders for OS MasterMap data based on those contracts or previous orders;
- schedule change-only update supply on a regular basis; and
- receive orders on media or download orders for OS MasterMap data from an FTP server.

All customers who wish to order data must have an account, which is set up using the registration facility on the OS MasterMap pages of the Ordnance Survey web site. Once the account is live you will be issued with an account number, user name (of your choice) and password. You can then access the OS MasterMap data selector to create estimates. Estimates can be converted to contracts online. Once a contract is in place, orders for OS MasterMap data can be placed based on that contract. Customer support is available from 08:30 to 17:30 hours weekdays (excluding Bank Holidays).

Your first task is to create an estimate using the estimates module of the data selector. The main parameters chosen by the user when creating an estimate are:

- The area required, specified as a polygon, selected by using one of the following options:
  1. User defined polygon defined by the user on maps of various scales, using a variety of tools.
  2. Pre-defined polygon (currently local authority administrative areas, Government Office Regions, postcode areas and the area within the M25).

Note regarding pre-defined polygons formed by using administrative boundaries:
Pre-defined polygons are formed using boundary information which may change over time. Local authority administrative boundaries are based on our Boundary-Line product which is regularly updated to reflect the changes which occur to administrative boundaries over time.

3 Importing Land-Line tile references.

4 Importing your own polygons.

This functionality will enable the import of polygons or lines in the formats listed below. Please note that constraints will apply depending on the size of polygon or line you wish to import. You may also find that the specification of your PC and browser affects the ability to edit the polygon/s once loaded.

Acceptable formats

- GML v2.1.2 – we only accept polygons in this format (not lines).
- MapInfo® MIF version 6 or later.
- ESRI® Shape (Arcview® 3.2) or later.
- DXF™ release 12 or later.

Constraints

The maximum number of nodes in a polygon/s is 50 000. For example:

- You can import one polygon containing 50 000 nodes or multiple polygons with a combined total of 50 000 nodes.
- The maximum number of nodes in a line or network is 10 000.
- The maximum width of a buffer that can be applied to a line is 10 000 metres.

Initial supply, change-only update and re-supply can be supplied for the whole of the user's selected contract area or ordered by subset. It is chunked to allow supply as manageable-sized files (see Chunking supply of data in chapter 1.9).

- The layer/themes of data required. Features that form part of several selected topography themes are supplied only once. Some themes are dependent on others being selected.
- The licence period you wish to use the data for.
- The number of terminals you will be using the data on.

Users will have access to an Imagery Layer coverage map of the UK to check the availability of their proposed purchase. They will also be able to view subsampled two-metre resolution imagery within the chosen area.

When ordering data, additional information is requested:

- The data format. There are two options for the Topography Layer: GML topological polygon data and GML independent polygon data. The Imagery Layer is available in TIFF, JPEG, MrSID and ECW.
- Full supply or change-only data, for non-imagery layers. If you select the latter you will need to give a change-since date (the date from which you wish to take any changed data).
- For imagery, you opt to receive all available data or that since a particular year. No imagery is more than 5 years old.
- The chunk size for non-imagery layers. Chunking of imagery is restricted to 1 km x 1 km. (See Chunking supply of data in chapter 1.9).
- The delivery mechanism. OS MasterMap data can be supplied via:

  FTP server:

  - Data supplied via the FTP server is limited to a size of 400 Mb; any order estimated at less than this volume but subsequently found to be more will be supplied on your chosen alternative media.
  - If you are taking data from our FTP server you will be advised by email when your data is ready for collection. The email will contain a URL address to access the server and instructions on how to download your data.
  - Readme files will be included with each order containing file references to the chunking of the data and other relevant information.

- Your data will remain on our FTP server for seven days for collection, after which time it will be deleted. It is not possible to remind customers to collect their data or to resurrect orders.

Media:

- Either CD or DVD. Readme files will also accompany this data, as detailed above.
- CD media data format – the directory and file naming convention used on this media conforms to the ISO9660 format using the Joliet and Rock Ridge file extensions.
- DVD media data format – the directory and file naming convention used on this media conforms to the Universal Disk Format (UDF), using the Joliet and Rock Ridge file extensions.

NOTE: The formats independent polygons and topological polygons are only relevant if you have ordered polygonised data, that is, the Topography Layer.

A purple-shaded overlay based on the feature density model is available for use within the user defined polygon sections of the data selector to give you a visual representation of the Topography Layer TOID density for any area. The cost of the data is related to the density of TOIDs within your selected area. The greater the TOID density, the higher the cost of the data. Address and ITN (Roads network) TOIDs are not included in the feature density model.

Once you have selected an area of mapping within the data selector you may tick the *Topo layer feature density* check box to overlay the density model onto the mapping. The colouring will vary from a very pale colour for a low TOID density area (such as the Highlands of Scotland) to a deep dark colour for the highest TOID density areas (such as London). The feature density layer box works like a toggle switch and must be ticked on or off to access the overlay.

You should then save your estimate and should you wish to convert it to a contract, this can be done online. Estimates are valid for 30 days (or until the next price change is implemented if sooner) but are held for six months, and can be recalled to set up your contract or to be amended. Saved estimates should always be recalculated before converting to a contract if they have been saved for longer than 30 days, in case of price changes.

After ordering data to be delivered online via the FTP server, you will be sent an email informing you when the data is ready to be downloaded.

For customers with small orders the option of FTP supply will be available, while larger orders will be supplied on either CD or DVD.

The OS MasterMap data selector can be accessed at any time (although support is only available between 08:30 and 17:30 hours weekdays, excluding Bank Holidays) using your user name and password, which were emailed to you when your account was set up. Your contract details can be accessed at any time and you will have the ability to order changed features with respect to a user-specified date (usually the date of last supply). See Change-only update service in chapter 1.9.

All GML files are compressed using the UNIX® gzip standard. The compression ratio achieved is approximately 20:1.

The OS MasterMap data selector is easy to use. Once you have accessed the service, just select from the options on screen and use the buttons on the left of the screen to navigate and confirm your selections. The online help facility gives more information on each part of the system, and we recommend that you read the OS MasterMap overview in the general information module.

Minimum system requirements for the data selector

The minimum system requirements for use of the OS MasterMap data selector are:

- Pentium® 2 processor; 350 MHz (more complex user-defined areas would require a higher specification processor).
- 15-inch monitor.
- 56.6 Kbps modem or, preferably, Broadband, ISDN or a T1 connection.
- Netscape® 7.0 or Internet Explorer version 5.5/6.0 or above browser.
- Screen resolution of 800 x 600.
- 16 000 colours.

The preferred browser is Internet Explorer version 5.5/6.0 or above. Your browser must also be Java® enabled: see the Ordnance Survey web site for further information. For data collection from the FTP server, your FTP client will need to be active. If you are ordering data for collection from the FTP server, please ensure that your firewall and Content Management Systems will allow access to Ordnance Survey FTP and web servers.

Storage of the data should also be considered when taking data via FTP. You will need to ensure that you have sufficient storage available to hold the amount of data requested (see volume indicator on the data selector when ordering).

Transfer rates

Download speeds using a modem may be affected by your Internet service provider connection. It is not possible to predict data download times exactly.

However, the following estimates (covering all nine themes of the Topography Layer) should offer some guidance:

1 Carmarthenshire

410 Mb
Using a 56.6 Kbps modem: 20 hours 42 mins
Using a 128 Kbps ISDN: 7 hours 18 mins
512 Kbps: 1 hour 49 mins
1 Mbps: 55 mins

2 Edinburgh

290 Mb
Using a 56.6 Kbps modem: 14 hours 36 mins
Using a 128 Kbps ISDN: 5 hours 6 mins
512 Kbps: 1 hour 17 mins
1 Mbps: 39 mins

3 Horsham

180 Mb
Using a 56.6 Kbps modem: 9 hours 6 mins
Using a 128 Kbps ISDN: 3 hours 12 mins
512 Kbps: 48 mins
1 Mbps: 24 mins

4 Rutland

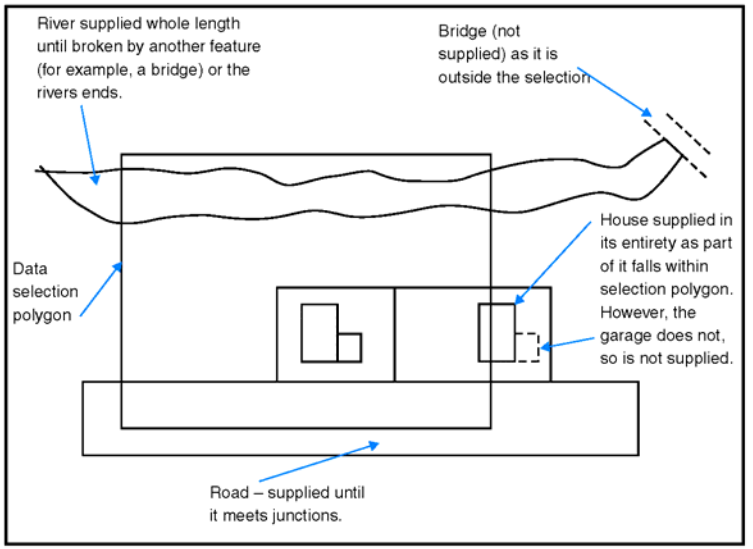
60 Mb
Using a 56.6 Kbps modem: 3 hours
Using a 128 Kbps ISDN: 1 hour
512 Kbps: 16 mins
1 Mbps: 8 mins

What is supplied – unclipped data

Topographic data

The following diagram shows how topographic data that overlaps the data selection polygon is supplied.

You will notice that the data is unclipped – that is, the line features of both independent and topological (see the Reference section, OS MasterMap user guide) polygon features that overlap the selection polygon, are supplied in their entirety. The only difference is that the attribution of those line features that are entirely outside the selection polygon is not supplied with independent polygons, but is with topological polygons.



The building that crosses the selection polygon has both its area and bounding line features supplied, as does the inferred property it lies within. However, the adjoining garage is not supplied as none of its walls fall within the selection polygon, except for the wall adjoining the house. The garage will appear as a hole in the property area feature.

Other features are supplied in the same way, such as roads and rivers.

Address data

Address features have a single point position and if that coordinate falls within the data selection polygon then the feature is supplied.

ITN (Roads network) data

The following table defines how ITN (Roads network) data is supplied in relation to the data selection polygon.

Feature type	Supply rules
Road	Any Road feature that refers to at least one RoadLink feature within the area of interest will be supplied.
RoadLink	All RoadLink features that intersect with the area of interest will be supplied in their entirety. RoadLink features referenced by a supplied Road feature but lying outside the area of interest are not supplied. RoadLink features referenced by a RoadRouteInformation feature but lying wholly outside the area of interest are not supplied.
RoadNode	All RoadNode features within the area of interest will be supplied. RoadNode features at the end of RoadLink features that are supplied but that themselves lie outside the area of interest are not supplied.
InformationPoint	All InformationPoint features within the area of interest will be supplied.
FerryLink	A FerryLink feature that references a FerryNode feature within the area of interest will be supplied.
FerryNode	A FerryNode feature within the area of interest will be supplied. A FerryNode feature outside the area of interest but referenced by a FerryLink feature intersecting the area of interest will not be supplied. A FerryNode feature outside the area of interest but referenced by a supplied FerryTerminal will not be supplied.
FerryTerminal	A FerryTerminal feature that references a RoadNode or FerryNode feature within the area of interest will be supplied.
RoadNode Information	All RoadNodeInformation features related to a RoadNode feature that is within the area of interest will be supplied.
RoadLink Information	All RoadLinkInformation features related to a RoadLink feature that intersects with the area of interest will be supplied.
RoadRoute Information	All RoadRouteInformation features related to any RoadLink feature that intersects with the area of interest will be supplied.
RoadPartialLink Information.	All RoadPartialLinkInformation features related to a RoadLink feature that intersects with the area of interest will be supplied.
RoadPartial RouteInformation	All RoadPartialRouteInformation features related to a RoadLink feature that intersects with the area of interest will be supplied.

Imagery Layer

Imagery will be supplied with the exact specified area, excepting areas that did not have imagery coverage at the time the estimate was created.

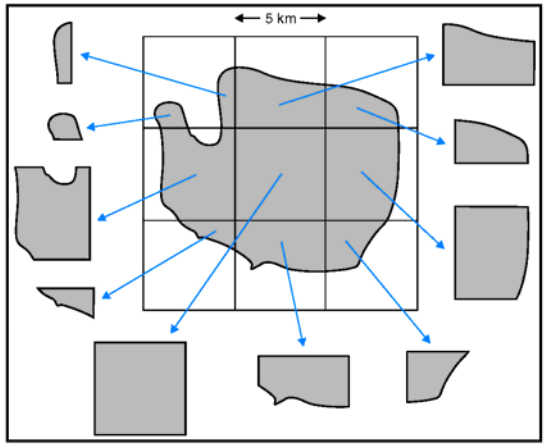
Chunking supply of data

Chunk boundaries are imposed purely for the purpose of dividing large supply areas into pieces of a manageable size in a geographically meaningful way. Both full supply and updates (whether change-only or full resupply) are chunked.

OS MasterMap data is seamless, so GML files containing vast areas could be very large. In order to provide files of a manageable size, data supplies are divided into chunks of a user-specified size, each of which is supplied in a separate GML file.

Chunks are defined by overlaying a floating square grid on the data selection polygon, such that the grid is optimally aligned with the data selection polygon. We recommend that national cover customers take 10 km by 10 km chunks although 5 km by 5 km chunks are provided by default. For any other sized order the customer can select from a choice of 2 km by 2 km, 5 km by 5 km or 10 km by 10 km chunks. Note that national cover cannot be provided in 2 km by 2 km chunks.

The Imagery Layer will only be supplied as 1 km by 1 km chunks. The part of the data supply area that falls in each chunk is supplied in a separate GML file. Where a chunk lies entirely within the data selection polygon, the GML file covers the entire square. Where the data selection polygon intersects the chunk, one or more GML files are created, bounded partly by the grid square edges and partly by the data selection polygon. The diagram here illustrates this.



The division of a data supply polygon (large grey region) into chunks by overlaying a 5 km chunking grid. In this case ten chunks are created. The central chunk is a complete grid square; the others are partly bounded by the data selection polygon. The upper left square shows the effect when the data selection polygon crosses a grid square twice – two or more separate chunks are created (see Counters in chapter 1.10).

Chunk size is particularly important when ordering the OS MasterMap Topography Layer. When selecting chunk size it is advisable to consider the spatial density of features in the contract area. The higher the density of features on the ground, the bigger the GML chunk files will be. For example, a customer in central London may wish to order data for the City of London in 2 km by 2 km chunks because London is densely populated with geographic features. Conversely, a customer in the North of Scotland may select a 10 km by 10 km chunk supply because the spatial density of features is relatively low.

Some systems have had trouble handling chunks with large file sizes, this has caused some systems to *hang* as a result. Systems suppliers are able to advise the best chunk rates for their systems.

In a GML data chunk, features are not clipped to the nominal supply boundary (see above, What is supplied – unclipped data). Therefore, each chunk includes all current features that overlap the nominal chunk boundary. In topological polygon data, line features that are outside the nominal boundary, but which are part of the geometry of area features inside the supply polygon, are also supplied. This ensures that the full geometry of all area features that overlap the chunk edge is available in each chunk.

A consequence of this is that some features are supplied in more than one chunk. Systems reading OS MasterMap data must identify and deal with these duplicated features. This applies not only to line and polygon features, but also to features with point geometry (that is, AddressPoint, TopographicPoint, CartographicPoint, and CartographicText features). This is because the query used to populate a chunk file includes all features that touch its boundary, and this boundary is shared with adjacent chunks.

Address features are the exception. Although Address features reference the building TopographicArea feature in which the AddressPoint lies, it is possible for the TopographicArea feature to be supplied in an OS MasterMap GML file without the AddressPoint feature, when both buildings and Address themes are requested. This happens when the TopographicArea feature intersects the chunk file boundary, but the address feature is outside it. In this case the Address feature will be found in an adjacent chunk file, unless the chunk in question is on the boundary of the supplied area. You should therefore ensure that whole buildings that hold the addresses you require are included when drawing your selection polygon in the online service.

Empty chunks are not supplied; that is, if a chunk contains no information relating to your selected themes then it would be an empty file, so is not supplied.

Chunks cannot be treated as persistent data management units; as it is a floating grid, the origin of the chunking grid may differ between orders.

Change-only update service

Once you have taken data from your agreed geographical contract area, you may request change-only update from a specified date (the change-since date). This is not applicable to the OS MasterMap Imagery Layer.

Update can be provided either in response to a user request or triggered at a regular supply interval (automatic change-only update service).

The automatic change-only update service allows the customer to request change-only update at regular intervals for new orders or new orders based on an existing order. We recommend that you avoid scheduling supply on the first and last days of the month as these are popular choices and may mean that your order takes slightly longer to process.

When using automatic change-only update, the data you receive will represent changes between the next scheduled change-only update request you have given and the creation date of the last scheduled COU oder if one exists. The last date can also represent the initial order on which the first schedule is based. Customers will either receive the data direct on media or an email confirming that the data is ready to be collected from the FTP server.

Manual change-only update is best taken with respect to the extraction date of the data last ordered under your contract. The use of extraction date rather than the date you last placed an order or the date you actually downloaded the data is important. These dates can be different, and it is important that you use the extraction date as this will ensure you do not miss any changes or receive any duplicate features. The service does not record when you have taken updates or the extraction dates of that data, so you will need to keep a record of this.

For FTP orders the extraction date is stored on the *<order num>-details.txt* file on the FTP server. For orders on media the extraction date is printed on the label and is contained in the *Disc Contents.txt* file.

Change-only update should not be taken for an area where you have not already taken full supply. If you have not taken full supply of data there will not be anything with which to compare the change-only update. You can take changes only or a complete re-supply of the latest data for your original area of interest. It may be necessary to take a re-supply to consolidate your holdings in the advent of corruption or data loss.

Like full supply, change-only update is available for supply via the FTP server and on media (CD and DVD).

You can order updates at any time and as often as you wish for the duration of the licence.

For information on how to manage your updates, see Updating your data holdings in chapter 1.10.

Passwords

Customers wishing to order OS MasterMap data will be required to register with Ordnance Survey to open a credit account. Once the account has been opened, you will be issued with an **account number**, **URL for the data selector**, **user name** (of your own choice) and a **password.** The user name and password will be needed to enable you to access the data selector to capture your area of interest and order data from your contract area. The first time you log onto the online service, you will be asked to change your password to one of your own choosing.

There will only be **one** password issued for each customer account, regardless of the number of contracts held by that customer. The password and user name will only be emailed to the person who has requested the account to be opened. All requests for changes to passwords, new passwords or updates to passwords will be validated with the person who asked for the account to be set up. Please ensure that provisions are made within your organisation to cover for any leave of absence of this person to ensure continuity of use.

Passwords are the responsibility of each customer and you must ensure that you protect your password from being disclosed or used by any unauthorised person or organisation. Remember you are responsible for your password and its use by any member or your organisation or any third party to which you are contracted. If you suspect that your password has been disclosed to an unauthorised person or organisation, you must change your password by using the change password function on the data selector.

You may change your password at any time using the data selector. This request will be validated with the account holder for your organisation by emailing the new password to them.

If you lose or forget your password you will need to request a new password via our Customer Service Centre, either by email to digitalsalesenquiries@ordnancesurvey.co.uk or by telephoning 023 8030 5520. Again this request will be validated with your organisation's account holder by emailing the new password directly to them.

The data selector will allow you ten attempts at inputting the correct password before you are blocked from entering it. If this occurs, you will need to contact the Customer Service Centre by either email or telephone (as above) to request a new password. Once again, any request will be validated with your company account holder. It will take time to issue a new password: please bear this in mind and safeguard your password.

For security reasons, your password is only valid for 180 days. After this time, when you next log onto OS MasterMap, you will be advised that your password has expired and asked to use the Change password button within the data selector to change your password. Please ensure that you notify all concerned within your organisation of this change, as we will not disclose it to others within your organisation.

Please remember to keep your password secure.

Estimate validity and retention

Estimates created and saved by a customer will be given a unique reference number, and are valid for 30 days (or until the next price change is implemented if sooner). We advise you to recalculate any estimate prior to placing an order to ensure that the automatic calculator uses the current prices.

Ordnance Survey will retain these estimates for a period of six months, after which time they will be deleted from our systems. No warning will be given before these estimates are deleted. Customers may at any time during those six months access any estimate they have saved by using its unique reference number.

Ordnance Survey reserves the right to vary the prices of its products but shall give you notice in accordance with your OS MasterMap contract.

Cookies

The OS MasterMap data selector makes no use of client-side cookies. These cookies are normally held on the filing system on the browsing PC and are the type of cookie that some organisations/users have disabled for security reasons.

We use session cookies. These are not stored on your hard drive; they are held in memory by your web browser and hold no data other than a unique identifier to identify your browser's session rather than any other browser's session.

The security risks attached to client-side cookies do not apply to session cookies and therefore there is no reason to have them disabled.

Web-based applications are based on the HTTP. This is a stateless protocol, which means there is no inherent way to track one request from the next made by a particular web browser.

We need to record the progress made by the browser in building up a new estimate or making a new order. The session cookie is a unique identifier that the browser will send with each individual request – this effectively enables us to identify requests being made by the same browser and therefore hold the state of their estimate or order.

All state is held on our web servers; nothing is held on the browser's PC. We do need the browser to support per session cookies and to have them enabled for this mechanism to work. All browsers that the service is compatible with do support session cookies and all of them have session cookies enabled by default. For more information on browsers, see Minimum system requirements for the data selector earlier in this chapter.

Security of information provided to the data selector and security of purchasing online

Security of your company information is treated seriously by Ordnance Survey. Your organisation's details are held in the secure area of our site, which requires a user name and password to access. It is your organisation's responsibility to safeguard your OS MasterMap user name and password.

The purchase area of our site is secure; this means that we utilise industry standard Secure Sockets Layer (SSL) technology to allow for the encryption of potentially sensitive information such as your name, address and other critically sensitive information. Information passed between your computer and our web site cannot be read (in the clear) in the event that someone else intercepts it. You may have noticed that the SSL certification is not being displayed (https in the address box and a padlock in the status window). This is because we are using frames to aid navigation. This page, however, is secure. This can be verified by right clicking on this screen and viewing its properties.

How customer information is protected in the data selector

When you place orders, we offer the use of a secure server. The SSL encrypts all information you input before it is sent to us. Furthermore, as required by the UK *Data Protection Act of 1998*, we follow strict security procedures in the storage and disclosure of information that you have given us to prevent unauthorised access. Our security procedures mean that we will routinely require proof of identity before we are able to disclose sensitive information to you.

Password management guidance

- Keep your user name and password secure within your organisation.
- If your password is compromised then it must be changed immediately.
- You should not disclose your password to anyone, even if they claim to be from Ordnance Survey or the police.
- Choose a password that has a mix of alpha, numeric, punctuation and/or shift characters.

Chapter 1.10 Data management guidelines

This section provides some introductory comments on managing OS MasterMap data in your system and applications.

OS MasterMap data is ordered from the OS MasterMap data selector. See Chapter 1.9 Guide to using the OS MasterMap data selector for more information on ordering data.

The way you manage your data will be dependent on the software you are using, but there are some basic principles your system should follow.

Essential functionality of software that can manage OS MasterMap includes:

- translation or import of GML format data into storage formats;
- removal of duplicate features, especially when loading chunked data, see Chunking supply of data in chapter 1.9; and
- applying change-only update to your data holding (see below).

Updating your data holdings

The OS MasterMap database is live and undergoes continuous revision. Period licence customers have unlimited access to change-only updates and can order updates or re-supplies at any time. When you order change-only update, you specify a change-since date, and all features that have changed since 00:00 hours on the date you specify are supplied. This will usually be the date of your last data supply, but could be a previous date.

It is not possible to obtain the exact change-only update since your last data supply. If you request change from the date of your last data supply, and there are changes between 00:00 hours on that day and the time of your last supply, some features supplied as change will already exist in your data holding.

Therefore, your system must check the TOID and version of every feature in the update against your current data holding, to determine whether it should be loaded, and if so, what existing feature(s) it replaces. This makes it possible to request and load change-only update with a date preceding your last data supply date, without damaging your data holding. This feature can be used to correct your data holding if inconsistencies have occurred due to partially loaded or non-sequential change-only updates, by ordering a single change-only update with a change-since date that precedes the problem updates.

Change-only information is available using the OS MasterMap online ordering and delivery service. You can interrogate this service by entering the date from which you wish to receive updates from. This can be any date, but you may wish to make it the date at which you last ordered a supply. Change-only update can be supplied for your whole contract area, or by subset (see What's new in version 5, chapter 1.2).

Change-only update will be chunked, see Chunking supply of data in chapter 1.9, and unclipped, see What is supplied – unclipped data in chapter 1.9.

For the Topography Layer, the information supplied in change-only update is different depending on whether independent polygon or topological polygon data is supplied, because an independent polygon area feature includes the full polygon boundary of the area, whereas a topological polygon area feature includes only references to line features. When some of the line features making up a polygon change, only those line features are supplied. Therefore systems that use topological polygon data must have access to the other unchanged line features in order to construct the polygon.

Important note about departed features in change-only update files

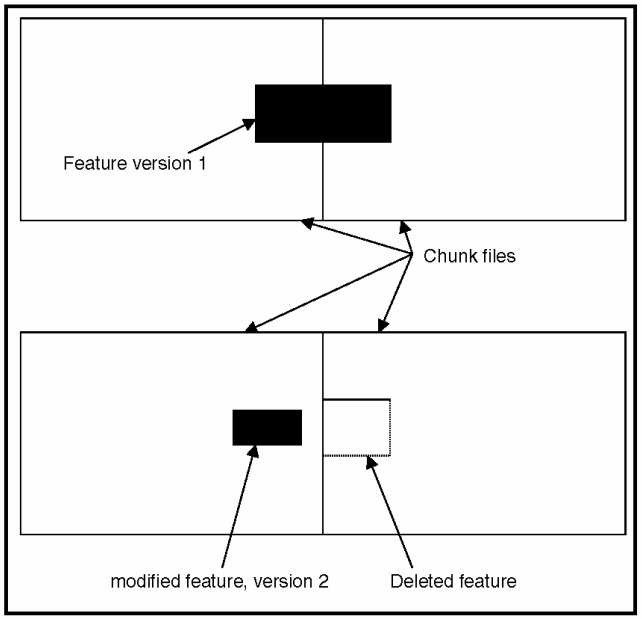
In OS MasterMap, change-only update data is supplied in multiple files, each of which contains a data *chunk*, see Chunking supply of data in chapter 1.9. The same TOID can appear as both a departed feature in one chunk file and as a modified feature in an adjacent chunk.

The reason for this is that the departed features in each chunk are those that have ceased to exist within the boundary of that chunk since the change-since date you specified. A feature may be departed because it has moved outside the boundary of the chunk. In other words, each chunk file reports change-only update with respect to the boundary of that chunk, and without knowledge of the other chunks in your order.

This can occur, for instance, when a feature used to lie partly inside the chunk in question but is now reduced in size so it no longer intersects that chunk, but is wholly within an adjacent chunk. In this case, it is reported as a departed feature in one chunk and as a modified feature (new version) in the adjacent chunk.

If you process change-only update chunk files one at a time, deleting all departed features from the data holding, you might be deleting some features that should still exist, because they are departed for the reason above. This problem can be avoided by making two passes through the set of change-only update files, the first pass applying departed features from all chunk files, and the second pass applying new or modified features from all chunk files.

If your system archives non-current OS MasterMap data and takes different actions in the cases of deleted features and superseded versions of features that still exist, you need to check which departed features are actually deleted (these are the ones with TOIDs that do not occur as modified features in any chunk), by cross-referencing between the two passes through the chunk files.



Increasing your data holdings

Existing contracts can be expanded online. You can add more themes, increase the number of terminals licensed to access the data and extend the geographic area. You can also enter into new contracts for other layers of data.

It is not possible to remove any of the existing area of interest or decrease the number of themes of an active contract.

Renewing your contract

When a contract expires, you will be able to renew it online. This will in effect create a new contract, which will be a copy of the original, with new start and end dates. You will be able to do this within the last thirty days before the contract expiry date. The start date of the new contract will be the day after the end date of the original one.

You will be prompted that your licence is due for renewal by email, telephone or letter.

If you wish to cancel a contract please refer to the cancellation provisions of your OS MasterMap contract.

File names

Each file supplied, except Imagery, has the following format: nnnnnn-llnnnn-nnlnnnn, for example, 123456-SU1212-2i3. This example is broken down as follows:

- 123456 is the order number;
- SU1212 is the 1 km square in which the south-west corner of the chunk falls, see Chunking supply of data in chapter 1.9;
- 2 is the chunk size, in this case 2 km by 2 km (this will be set to 5 for 5 km by 5 km or 10 for 10 km by 10 km);
- i is a flag indicating that the data selection polygon does not completely fill the chunk square, if it does this will be shown as a c. If an area selection contains no data then the data file will not be supplied, however, a reference to the empty chunk file will be shown by the letter e in the filename; and
- 3 is a counter (see Counters below) to provide a unique filename in the case of multiple chunk files within 1 chunking grid square. This can have a value between 1 and 9999.

Each Imagery file is supplied in a 1 km by 1 km square and has the following format, with the date being the date flown:

- OSIM_SU4657_2002-03-24.tif

When a km has been cropped because of the area selected, the file naming convention will be:

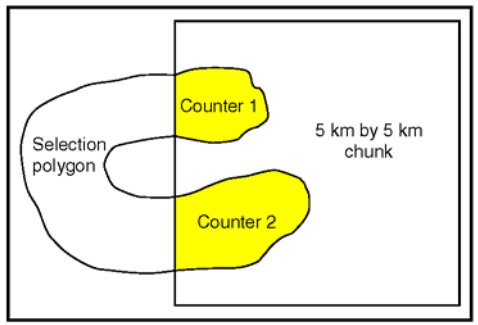
- OSIM_SU4657_2002-03-24_part.tif

Imagery file sizes are estimated to be:

File format	Sub-format	Compression type	Files supplied	Typical size (for 1 km^2)
TIFF		Uncompressed	*.tif, *.tfw	47 Mb
JPEG		JPEG compression	*.jpg	32 Mb
ECW		Wavelet compression	*.ecw	1.5 Mb
MrSID		Wavelet compression	*.sid	1.5 Mb

Counters

As outlined in Chunking supply of data in chapter 1.9, when a data selection polygon appears more than once within a chunk square, each selection polygon is supplied in separate files. The following diagram shows what happens in the instance of a selection polygon that falls within a chunk square twice.

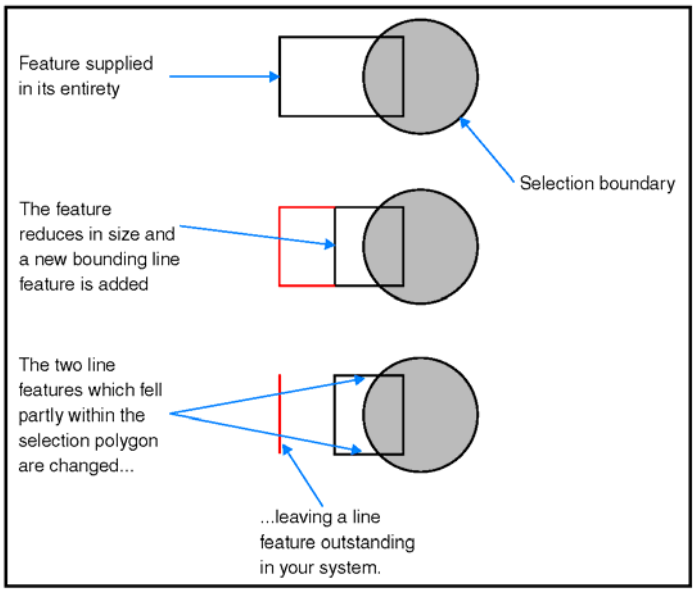


Two files are supplied, each one distinguished by a counter number – 1 and 2. The counter numbers are included in the file name; see File names in chapter 1.10.

Feature housekeeping

Software designed to maintain an OS MasterMap data holding should be capable of feature-level housekeeping functions. An example of such a function is the removal of features that are entirely outside the user's nominal data holding area, and are not referenced by features within the area. Line features can occur in this state if they were once part of a polygon that overlapped the data area but are no longer part of that polygon.

These line features will be left in your data holding unless your system is capable of dealing with them, and may conflict with other features.



Filtering descriptive attributes

The description of an OS MasterMap topographic feature is contained in its feature type, descriptive group(s), descriptive term(s) (when present), physical presence (when present) and make attributes. The feature code attribute does not add any extra information to that contained in these descriptive attributes – it is determined by rules based on the descriptive attributes. Hence, the feature code can be ignored by your system without losing any information. The same is true of the theme attribute, with the exception of line features, which as well as being themed based on their own descriptive attributes, are also members of the themes of the area features that they bound.

The feature code and theme attributes are an example of filtering features based on their descriptive attributes. Software capable of handling OS MasterMap should provide flexible methods of filtering features, which means taking actions based on the descriptive attributes of each feature. These actions include sending features into different GIS data layers and applying different cartographic styles to features. The OS MasterMap feature code and theme attributes may or may not be useful in doing this, depending on your requirements. A customisable filter based on descriptive attributes will allow you to effectively set up the data subsets most useful in your application.

Chapter 1.11 OS MasterMap and positional accuracy

Ordnance Survey has implemented a national programme to improve the absolute positional accuracy of its detailed mapping data of rural areas at 1:2500 scale. (Absolute positional accuracy is a measure that indicates how closely the coordinates of a point in Ordnance Survey map data agree with the true National Grid coordinates of the same point on the ground.)

As a result of new technology, such as GPS and digitally scanned aerial photography, we can now collect mapping data at a greater accuracy and with more efficiency than in the past.

The national programme uses this wealth of new technology to improve positional accuracy of our 1:2500 scale mapping. We believe that it is vital to tackle this now to ensure our 1:2500 scale rural areas map data meets modern quality standards and to ensure that the accuracy level will be suitable and acceptable in the future for our customers.

Features that have had their ‘absoluteaccuracy of position’ improved are issued as part of the change only update data, as they have had a change in version number and date. They can normally be identified by feature level inspection of the changeHistory attributes, with the specific value in the GML of, reasonForChange value = 'Position'.

For more information on our positional accuracy programme, see our web site http://www.ordnancesurvey.co.uk/positional.

Chapter 1.12 OS MasterMap quality statements

Purpose

This specification defines the quality standards that Ordnance Survey will apply to all OS MasterMap data supplied to customers.

The definition of quality in this document is a measure of performance against specification. Specific metrics are included where they are available; future ones will be added as they become available.

At the end of the chapter are details of known data conformance issues that may affect customers' use of the data.

Scope and definitions

Coverage

In all cases the quality statements apply at a national level unless explicitly stated. Within this dataset there is the possibility of local variances from the expected standards.

Acceptable quality level (AQL)

The AQLs given in this document apply to the whole database. Sample blocks of 5 km by 5 km will be used to measure the conformity of the data.

A total of 95% of sample blocks will meet the stated AQLs.

Confidence levels

When measured as a percentage, gives the amount of data that conforms to the measurable. A confidence level of 95% means that Ordnance Survey believes 95% of data conforms to the published criteria.

Real-world object

An object in the real world, such as a building, fence, area of road or land.

Feature

The item in the database that represents a real-world object, a non-real-world object, part of an object, or several objects.

Lineage

Great Britain was completely remapped between the years 1946 and 1983, and this mapping continues to be updated and upgraded. Since 1946 surveying and mapping techniques have developed and the specifications for capture and maintenance of the mapping have changed to meet new user requirements. Consequently, maps have been produced by a number of different methods, producing a range of accuracies and content within the overall tolerances appropriate to the scale of the published map.

The graphic mapping was digitised from published Ordnance Survey topographic maps created from ground or photogrammetric surveys. Large-scale topographic maps were traditionally published at scales of 1:1250 (urban areas), 1:2500 (rural areas) and 1:10 000 (mountain and moorland areas). The survey practices and quality control procedures adopted during their production were designed to ensure that the resulting maps are true cartographic representations of the landscape, commensurate with the scale of publication. These maps were not intended to represent surveys of engineering quality or precision but are a multipurpose series of general topographic maps.

The digitising programme began in May 1971, and was aimed at the automation of graphic map production. The increasing demand for digital data in the 1980s led to an acceleration in the digitising programme and coverage of Great Britain was completed in 1995. These digital maps have been constantly revised within a digital environment since their initial capture and are now known as the Land-Line product.

In April 2000 Ordnance Survey commenced a programme to convert the unstructured, tile-based data, into an object-based, seamless dataset to form the basis of OS MasterMap. The resultant data was further improved in a manual editing programme finishing in October 2001.

Content specification changes

There have been small changes to elements of the content specification (now the OS MasterMap real-world object catalogue) since the initial digitising programme commenced in 1971. Such changes have not normally been implemented retrospectively.

This means that within the data there are features that do not fully comply with the current OS MasterMap real-world object catalogue. For example, Ordnance Survey historically captured all buildings greater then 8.0 m^2 in private gardens. This minimum size was increased to 12.0 m^2 in 1988. Buildings now considered undersized, but captured before that date, could remain in the data.

Quality statement components

Ordnance Survey assesses the quality of OS MasterMap data by five quantifiable components:

- completeness;
- positional accuracy;
- temporal accuracy;
- logical consistency; and
- attribute accuracy.

These quantifiable components apply to all OS MasterMap layers unless they are specifically identified under each OS MasterMap layer heading below.

Each component is described by the following parameters.

Definition – the description of the particular quality parameter.

Measurables – the set of one or more measures against which the parameter is assessed.

Conformity – the limiting value for each measure that any metric is not expected to exceed.

Correction – the protocol for correcting nonconformance.

Improvement – the protocol for improving data that is within the limiting values.

Completeness

Definition

Completeness is a measure of the correspondence between the real world and the specified data content for OS MasterMap as reflected in the OS MasterMap real-world object catalogue.

Temporal validity (commonly known as currency) is described as the capture of change and is considered later in this chapter.

Measurables

Omission

- Features representing (a) real-world object(s) that conform to the OS MasterMap real-world object catalogue are not contained in the data.

Comission

- Features representing departed real-world objects remaining within the data.
- Features are captured that do not conform to the OS MasterMap real-world object catalogue.

Conformity

Ordnance Survey continually monitors the data to ensure that only features representing real objects in the OS MasterMap real-world object catalogue are captured as part of revision and that features representing no longer extant real-world objects are deleted.

We do not routinely remove features that were in previous versions of the content specification if they represent objects in the real world that still exist.

Ordnance Survey does not capture metrics on completeness because of the difficulty in establishing numerical baselines for the real world and the data. Capture of change is described under Temporal consistency.

Correction

Any reported errors of comission or omission are addressed during the normal update cycle, or earlier if warranted by their impact on customers' business.

Improvement

Ordnance Survey will continue to monitor the data collection processes and to review the OS MasterMap real-world object catalogue periodically to meet customers' requirements.

Positional accuracy

Positional accuracy has three main components: geometric fidelity, relative accuracy and absolute accuracy.

Geometric fidelity

Definition

Geometric fidelity is the trueness of features to the shapes and alignments of the real-world objects they represent. Normally geometric fidelity takes priority over relative and absolute accuracy.

Measurables

The degree to which:

- detail that is square on the ground is represented as square in the data, and shapes must be accurate;
- alignments that are straight in the real world are represented as straight lines within the data;
- lines of sight that pass through ground points should, when plotted at the scale of the original survey, pass through the plan positions of the corresponding points; and
- adjacent features are in sympathy with each other as regards alignment and orientation.

Conformity

Acceptable geometric fidelity is defined as when data is plotted or displayed at the source scale of the mapping from which the data was originally digitised (see Lineage). It reflects the real-world object(s') geometry.

Ordnance Survey does not collect statistics on this item but continually monitors the data collection methods to ensure compliance to an acceptable level of geometric fidelity.

Correction

Any reported errors are addressed during the normal update cycle, or earlier if warranted by their impact on customers' business.

Improvement

Errors in geometric fidelity will continue to be corrected to ensure that all data has acceptable geometric fidelity.

Relative accuracy

Definition

Relative accuracy is the positional consistency of a data point in relation to other local data points.

Measurable

The comparison of the scaled distance between features measured from the data with the distances measured between the same features on the ground.

This measurable refers to well-defined points in the real world, for example, building corners or fence junctions.

Certain types of features, such as underground features, vegetation and landform limits, can be surveyed to a lesser degree of accuracy.

Conformity

Ordnance Survey has continually sampled data and tested the relative accuracy of well-defined points of detail. The table below shows the aggregated average results of testing from the last 30 years.

Data capture standards (original capture scale)	Relative error 99% confidence level	Maximum measured distance
Urban (1:1250)	< ± 1.1 m	60.0 m
Rural (1:2500 resurvey or reformed)	< ± 2.5 m	100.0 m
Rural overhaul (1:2500 pre-positional accuracy improvement)	< ± 4.7 m	200.0 m
Mountain and moorland (1:10 000)	< ± 10.0 m	500.0 m

Example of relative error statistic

Urban (1:1250)

If the distances between well-defined points of detail 60.0 m apart were measured in the real world, there is an expectation that 95% would be represented in OS MasterMap by a scaled distance of between 59.2 m and 60.8 m.

Correction

Any reported errors outside the expected range are addressed during the normal update cycle, or earlier if warranted by their impact on customers' business.

Improvement

Ordnance Survey is improving the positional accuracy of OS MasterMap rural overhaul areas through our Positional accuracy improvement programme – http://www.ordnancesurvey.co.uk/positional/.

Absolute accuracy

Definition

Absolute accuracy is a measure that indicates how closely the coordinates of a point in the dataset agree with the true coordinates of the same point on the ground in the British National Grid reference system.

Measurable

The comparison between the position recorded in the data and the true position of the feature on the ground.

Conformity

Ordnance Survey has continually sampled data and tested the absolute accuracy of well-defined points of detail. The aggregated average results of this testing over the last 30 years show that the absolute accuracy of existing data is as shown below in table.

Data capture standards (original capture scale)	99% confidence level	Current accuracyOfPosition attribute value*
Urban (1:1250)	< ± 1.0 m	< ± 1.0 m
Rural (1:2500 resurvey or reformed)	< ± 2.4 m	< ± 2.5 m
Rural overhaul (1:2500 pre-positional accuracy improvement)	< ± 5.8 m	< ± 6.0 m
Mountain and moorland (1:10 000)	< ± 8.8 m	< ± 8.0 m

**NOTE: these differences are due to Ordnance Survey refining the positional accuracy statements. The accuracyOfPosition attribute values will be revised to reflect this in a future release.*

Example of absolute error statistic

Urban (1:1250)

If the coordinates of a well-defined point of detail in OS MasterMap are compared to their *true* position, the expectation would be that in 95% of cases they would lie within a circle of radius 1.0 m from the *true* value.

Correction

Any reported errors are addressed during the normal update cycle, or earlier if warranted by their impact on customers' business.

Improvement

Ordnance Survey is improving the positional accuracy of rural overhaul (1:2500 scale pre-positional accuracy improvement) OS MasterMap through our Positional accuracy improvement programme – http://www.ordnancesurvey.co.uk/positional/.

Temporal accuracy

The two components of temporal accuracy are consistency and validity.

Temporal consistency

Definition

Shows how well ordered events are recorded in OS MasterMap.

Measurables

- TOID version numbers for change-only update will only increase with time for updated features.
- TOID version dates for change-only update will only increase with time for updated features.
- Version dates and history dates relate to date of update.

Conformity

TOID version numbers increase by one or more for each feature update.

TOID version dates increase for each feature update but do not exceed delivery date.

History dates are equal to or less than the last version date.

AQL – 100%

Correction

All errors are identified by validation software; most are corrected immediately. Residual errors are addressed when notified by customers if warranted by their impact on customers' business.

Improvement

Ordnance Survey will introduce new technology and procedures that ensures each update of a feature is represented by a unit increase of its feature's version number.

Temporal validity (currency)

Definition

Temporal validity is defined as the amount of real-world change that has been incorporated into OS MasterMap data that is scheduled for capture under current specifications.

Real-world change is measured in units of change – see appendix B.

Measurables

- The amount of real-world change that has been incorporated into OS MasterMap within the published timescales.

Conformity

Capture of real-world change.

Known category A change (see appendix B) will be captured and made available as OS MasterMap data within six months of the change occurring, subject to the following:

- Isolated houses, traffic-calming measures and mobile/park homes will only need to meet this requirement once an area has been subject to a national sweep, unless they form an integral part of a new development.
- For the rural and moorland areas yet to undergo any form of cyclic revision, only category A change exceeding one hectare in extent, or one km for linear features, will be captured.

AQL – an average of 0.6 category A units of change per 0.25 km^2 in urban areas and per km^2 in rural areas over six months old remains unrevised. Generally no known task that is in excess of 10 units of change and over six months old will remain unrevised.

Rural and moorland areas will be subject to a programme of cyclic photogrammetric revision – known as the national sweep. Categories A and B (see appendix B) will be surveyed and made available within OS MasterMap.

AQL – an average of 4.0 units of change per km^2 in rural/moorland areas, including 0.6 category A units of change, may remain unrevised. Generally no individual km^2 in rural and moorland areas will contain more than 15 units of change uncaptured that were in existence at the date of the photography used to revise the data.

Category C data will normally only be revised when required to logically complete revision of category A or B detail (see appendix B).

Correction

We aim to survey, within three months of notification by a customer, any category A change not surveyed within six months of the change occurring on the ground.

Any uncaptured category B change that was in existence at the date of the photography used for cyclic revision will generally be subject to remedial action within six months of notification.

Improvement

Ordnance Survey is seeking to continually improve currency, and is investigating the use of pre-build and developers' plans to make information available at the earliest opportunity.

Logical consistency

Definition

The logical consistency of OS MasterMap is a measure of how well the data supplied matches the specification. This covers the logic within the data and the syntax of the files supplied.

The data is checked for conformance to the specification laid down in this user guide. We strive to ensure that there is no variation against the specification. However, the specification itself may allow for some variation in the way that particular features are represented.

The checks performed test how well the data conforms logically to the specifications, not the content. In some cases data may be logically correct in that it conforms to the specification, but some elements may be of limited use – the section on known data conformance issues within this chapter details identified examples.

Measurables

There are four components of logical consistency that can be measured against the current OS MasterMap specifications:

- Conceptual – the data maintenance rules in the overview and life cycle specifications.
- Value domains – the values given in the attribute and classification specification.
- Physical structure – of the stored and delivered datasets – the database schema and GML formats.
- Topological – the explicit topological references between features – the values given in the geometry and topology specification.

Conformity

All logical consistency components are fully checked by software, but there are some inconsistencies. Therefore, provisional values for the national dataset are:

- Conceptual – the life cycle of a feature is a subjective measure relying on the interpretation of those updating the data. Ordnance Survey is testing revision activity and will publish metrics when they become available.
- Value domains – 100% will meet the specification.
- Physical structure – 100% will be valid as per the specification.
- Topological – 100% will be valid as per the specification.

Improvement

Improved editing software will be introduced to enhance the conformity of conceptual logical consistency.

Thematic (attribute) accuracy

Definition

How accurately the attributes within OS MasterMap record the information about a real-world object.

Measurable

The three components of attribute accuracy that can be measured:

- Feature descriptive groups and descriptive terms correctly representing attributes of the real-world objects.
- Change through time attributes correctly reflecting the reasons for change for OS MasterMap features.
- CartographicText correctly represents the real-world object that it refers to via an OS MasterMap feature.

Conformity

Ordnance Survey continually monitors data collection to ensure that attributes reflect the real world.

Ordnance Survey will be sampling to establish metrics of the following conformance measures.

The percentage of descriptive groups that are correct.

The percentage of change through time attributes that correctly reflect the change that OS MasterMap features have undergone.

The percentage of newly captured CartographicText that correctly describes the feature.

Correction

Any reported attribute errors are addressed during the normal update cycle, or earlier if warranted by their impact on customers' business.

Improvement

Ordnance Survey will continue to monitor the data collection processes, and to review the specification periodically to reflect customers' requirements.

The 2002 Quality improvement programme will progressively upgrade descriptive terms with the value of *unclassified*.

Tracks and unmade paths are not explicitly identified by descriptive group, and currently appear in the land theme, not the roads, tracks and paths theme.

Address Layer

Completeness

Definition

Completeness is a measure of the correspondence between the specified data content for OS MasterMap and Royal Mail's PAF.

Measurables

The measurable is the correlation between the monthly PAF and the Ordnance Survey Address Layer.

Conformity

The monthly PAF update is processed and updated into the Ordnance Survey Address Layer, generally within a month of being received.

Correction

Any reported errors of comission or omission are addressed by Royal Mail or Ordnance Survey. Ordnance Survey will endeavour to rectify errors within its remit ideally within one month, but within a maximum of three months.

Improvement

Ordnance Survey will continue to monitor processes and to review the update of OS MasterMap addresses periodically to meet customers' requirements.

Geometric fidelity

Definition

Geometric fidelity is a measure of the correctness of the spatial relationship of AddressPoint features to either a building or structure in the OS MasterMap Topography Layer or an estimated position on the National Grid.

Measurables

The coordinates of AddressPoint features that refer to a building or structure in the OS MasterMap Topography Layer, will lie within the boundaries of the area feature representing that building or structure.

Conformity

A total of 100% of AddressPoint features referring to a building or structure in the OS MasterMap Topography Layer will lie within the boundaries of the area feature representing that building or structure.

Correction

Ordnance Survey will endeavour to correct geometric fidelity errors ideally within one month, but within a maximum of three months.

Improvement

Ordnance Survey will continue to monitor processes and to review the update of OS MasterMap addresses periodically to meet customers' requirements.

Temporal validity (currency)

Definition

Currency is a measure of the percentage of addresses matched to a final real-world position with respect to the total number of addresses in the PAF.

Measurables

Ordnance Survey measures the percentage of addresses matched to a final position at both a national and postcode sector level.

Conformity

A minimum of 95% of addresses will be matched to a final position in every postcode sector.

- In 96% of Urban postcode sectors, at least 97.8% of addresses will be matched to a final position.
- In 96% of Rural postcode sectors, at least 97.0% of addresses will be matched to a final position.

It should be noted that there will be a delay between PAF update being loaded and the match process being completed. Therefore the percentage of addresses matched to a final position will vary within the update cycle.

Correction

Any reported errors of comission or omission are addressed by Royal Mail or Ordnance Survey. Ordnance Survey will endeavour to rectify errors within its remit ideally within one month, but within a maximum of three months.

Improvement

Ordnance Survey will continue to monitor processes and to review the update of OS MasterMap addresses periodically to meet customers' requirements.

ITN (Roads) Layer

Completeness

Definition

Completeness measures how many ITN (Roads) RoadLink and RoadNode features captured under current specifications are present compared with the real world.

Measurables

- Visual checks against OS MasterMap Topography Layer
- Field auditing

Conformity

At least 99.5% of polygons representing a road in OS MasterMap will have ITN RoadLink features and RoadNode features.

At least 95% of road names, numbers and extents in the ITN (Roads) will match the corresponding road name, number or extent as captured within the OS MasterMap Topography Layer.

At least 95% of Road Routing Information, captured under current specifications, will be present and correctly related to the relevant RoadLink and/or RoadNode features.

Whilst Ordnance Survey makes every effort to ensure that all roads, features and attributes are captured, it cannot guarantee that the current ITN (Roads) contains all roads in Great Britain.

Correction

We aim to correct any errors of comission or omission reported to the ITN maintenance team ideally within one month, but within a maximum of three months.

Improvement

Ordnance Survey will continue to monitor the data collection processes and review the OS MasterMap ITN (Roads) RoadLink and RoadNode features periodically to meet customers' requirements.

Geometric fidelity

Definition

The relationship between ITN (Roads) RoadLink and RoadNode features and their associated features in the Topography Layer.

Measurables

Whether ITN RoadLink and RoadNode features are positioned within the defined or inferred limits of their associated features in the Topography Layer.

Conformity

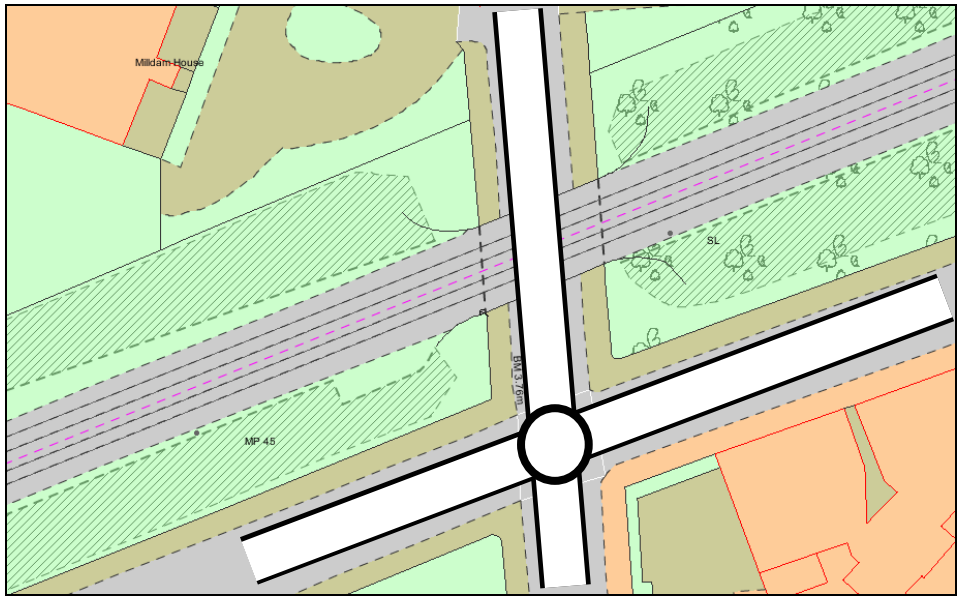
At least 99% of ITN (Roads) RoadLink features will correctly represent the general geometric alignment of the road and lie within the corresponding OS MasterMap topographic feature representing the road. The exception to this where there is a delay in updating the Topography Layer. In this case ITN (Roads) features may not be in geometric sympathy with the Topography Layer.

At least 99% of nodes should only exist at road junctions, breaks for name change or culs-de-sac.

A total of 100% of ITN (Roads) RoadLink features will remain unbroken where they pass through tunnels or under bridges, viaducts, buildings, footbridges and gantries.

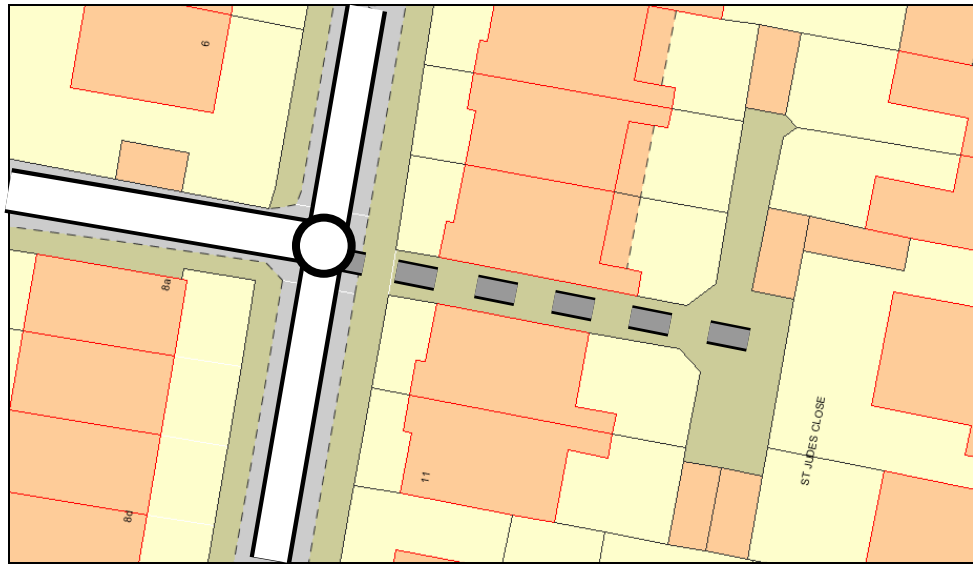
Example 1: Road under railway bridge

The RoadLink features, represented here as thick white lines, are broken at the road junction but not at the railway bridge.



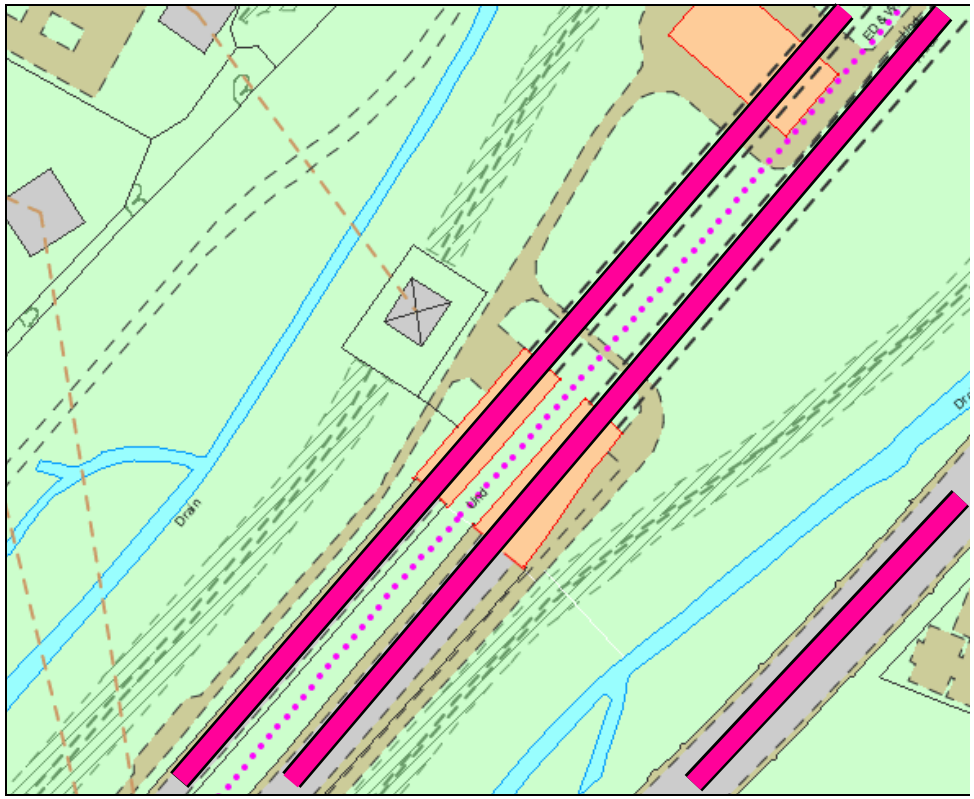
Example 2: Alley

The RoadLink features, represented here as thick white lines, are broken at the road junction but not across the pavement.



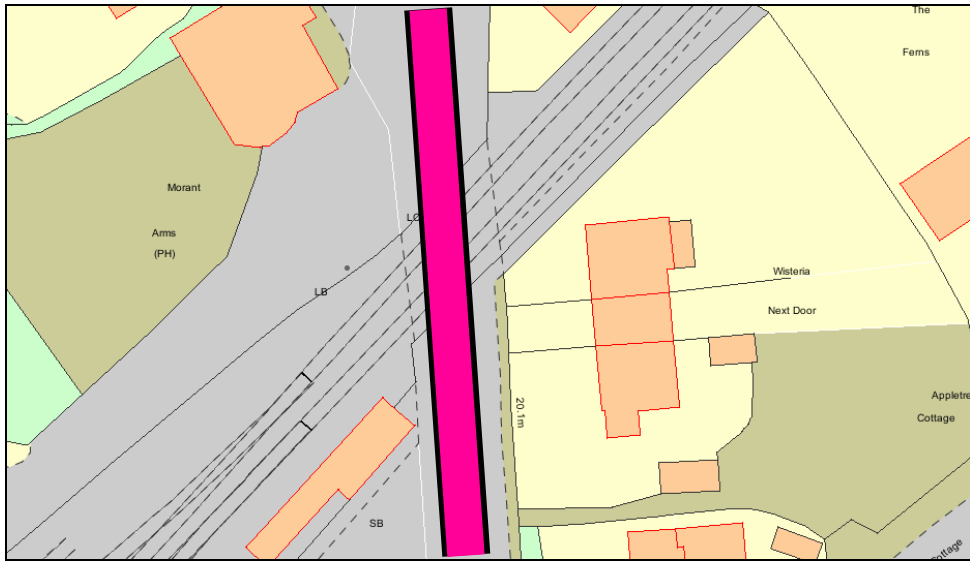
Example 3: Tunnel

The RoadLink features, represented here as thick red lines, are not broken at the tunnel entrance.



Example 4: Level crossing

The RoadLink feature, represented here as a thick red lines, is not broken across the level crossing.



Correction

We aim to correct any reported errors of comission or omission reported to the ITN maintenance ideally within one month, but within a maximum of three months.

Improvement

Resources are directed towards continually maintaining all ITN RoadLink and RoadNode features within the defined or inferred limits of the relevant features in the Topography Layer.

Temporal accuracy

Temporal validity (Currency)

Definition

Temporal validity is defined as the amount of real-world change and/or RRI scheduled for capture under current specifications that has been incorporated into OS MasterMap data.

Measurables

The amount of real-world change and/or RRI that has been incorporated into OS MasterMap within the published timescales.

Conformity

Changes to or new ITN (Roads) feature alignments are related to OS MasterMap revision of Category A change and will generally be captured within six months of occurring.

Changes to classification of road networks will generally be captured within six months of occurring.

Changes to RRI will generally be captured within six months of occurring.

Correction

We will aim to correct any reported errors of comission or omission, ideally within one month, but within a maximum of three months.

Improvement

Ordnance Survey is seeking to continually improve currency, and is investigating the use of pre-build and developers' plans to make information available at the earliest opportunity.

Thematic (attribute) accuracy

Definition

How accurately the attributes within OS MasterMap record the information about a real-world object.

Measurables

The three components of attribute accuracy that can be measured:

- Feature descriptiveGroup and descriptiveTerm attributes representing attributes of real-world objects.
- reasonForChange attributes correctly reflecting the change through time of OS MasterMap features.

Conformity

ITN road classifications will match the real-world classification as follows:

- At least 99% of ITN road B classification and above will be correct
- At least 97% of all other ITN road classification will be correct
- At least 95% of natureOfRoad attributes will be correct where compared against the OS MasterMap Topography Layer; and
- At least 99% of grade levels will be correct where compared against the OS MasterMap Topography Layer.

Correction

We will aim to correct any reported errors of comission or omission reported to the ITN maintenance team ideally within one month, but within a maximum of three months.

Improvement

Ordnance Survey will continue to monitor the data collection processes and to review the specification periodically to reflect customers' requirements.

Imagery Layer

The Imagery Layer comprises existing imagery and new imagery, which are defined as follows:

- Existing imagery – orthorectified imagery suitable for the OS MasterMap Imagery Layer, created prior to 1 January 2003.
- New imagery – orthorectified imagery suitable for the OS MasterMap Imagery Layer, created after 1 January 2003.

The following quality statements are common to both existing and new imagery:

Completeness

Definition

Completeness is a measure of the planned national coverage against the actual imagery coverage achieved.

Measurables

- Software validation
- Visual checks

Conformity

OS MasterMap Imagery Layer includes land to Mean High Water in England and Wales and to Mean High Water (Springs) in Scotland. As far as the source photo coverage allows, foreshore and sea will be included in tiles which have some land cover. The default colour for areas within Km tiles where there is no imagery coverage, is black.

Correction

No correction that requires either the return of imagery to the supplier for reprocessing, or the capture of new imagery specifically to correct an error, will take place unless Ordnance Survey believes that failure to do so would have serious consequences for customers' ability to use the data

Improvement

Ordnance Survey will continue to monitor the imagery collection processes and review OS MasterMap periodically to meet customers' requirements.

Geometric fidelity

Definition

Geometric fidelity is the trueness of features in the Imagery Layer to the shapes and alignments of the real-world objects they represent.

Normally geometric fidelity takes priority over relative and absolute accuracy.

Measurables

The degree to which:

- Detail which is square on the ground is represented as square in the Imagery Layer, and shapes must be accurate.
- Alignments which are straight in the real world are represented as straight lines within the Imagery Layer.
- Lines of sight which pass through ground points should, when viewed at actual pixel resolution (1:1 scale), pass through the plan positions of the corresponding points in the Imagery Layer.
- Adjacent features are in sympathy with each other as regards alignment, and orientation.

Conformity

Acceptable geometric fidelity quality is defined as when the Imagery Layer is viewed at actual pixel resolution (1:1 scale), it closely reflects the real-world object(s) geometry.

Ordnance Survey continually monitors the imagery to ensure compliance with the acceptable quality levels for geometric fidelity.

Correction

No correction that requires either the return of imagery to the supplier for reprocessing, or the capture of new imagery specifically to correct an error, will take place unless Ordnance Survey believes that failure to do so would have serious consequences for customers' ability to use the data.

Improvement

Resources are directed towards continually improving each update of the imagery to improve the acceptable quality levels for geometric fidelity.

Image appearance

Definition

Overall appearance and quality of the imagery. The imagery must be pleasing to the eye and have minimal artefacts.

Measurables

- Artefacts – scratches, hairs, dust, flies or similar.
- Clipping – clipping at the extremes of the histogram.
- Cloud cover/cloud shadow.
- Colour.
- Contrast.
- Sharpness and image smearing.
- Obscuring shadow – such that ground detail within the shadow is not visible.

Conformity

Images are substantially free from artefacts. Small amounts are acceptable in localised areas and only where significant features are not obscured.

Clipping of the extremes of the image greyscale histograms is minimised and avoided wherever possible.

Cloud cover and cloud shadow is less than 5% per sq km image and the detail obscured is not urban or of major significance in rural areas.

Colour and contrast will be as consistent and as near to a realistic representation of the true colour on the ground as possible.

The image will be sharp when viewed at actual pixel resolution (1:1 scale) and will not show unnecessary grain or softness due to flying conditions or image processing. Image smearing, blurring or ghosting will be minimised.

Obscuring shadow (that is, where it is not possible to interpret and identify topographic features, such as street furniture, road markings, access routes and extent of buildings) will be minimised.

Correction

No correction that requires either the return of imagery to the supplier for reprocessing, or the capture of new imagery specifically to correct an error, will take place unless Ordnance Survey believes that failure to do so would have serious consequences for customers' ability to use the dataImprovement

Resources are directed towards continually improving the image appearance with each update of the imagery.

Mosaicking

Definition

The process of creating a single image of a defined geographic area from a number of smaller images of the same geographic area.

Measurables

- Join visibility
- Colour and contrast balancing across the constituent images, with the exception of seasonal variances.
- Image consistency.

Conformity

Visual inspection by Ordnance Survey will ensure that all imagery has:

The apparent lines indicating the seam between images, flight lines and blocks is kept to a minimum and should not obscure or blur the resultant image. However, some visible joins are acceptable if the colour difference is slight.

Colour and contrast will be balanced across the different orthorectified aerial images within the blocks. The occurrence of colour and contrast differences will be minimised.

Image consistency within the blocks is achieved.

Correction

No correction that requires either the return of imagery to the supplier for reprocessing, or the capture of new imagery specifically to correct an error, will take place unless Ordnance Survey believes that failure to do so would have serious consequences for customers' ability to use the data.

Improvement

Resources are directed towards continually improving the mosaicking process with each update of the Imagery.

Existing imagery

The following quality statements are specific to imagery created prior to 1 January 2003:

Absolute accuracy

Definition

Absolute accuracy is a measure that indicates how closely the coordinates of a point in the Imagery Layer agree with the true coordinates of the same point on the ground in Ordnance Survey National Grid.

Measurables

The comparison between the position recorded in the Imagery Layer and the true position of the feature on the ground.

Conformity

Data capture standards	RMSE*
Urban and rural areas	2.5 m
Mountain and moorland areas	4.0 m

*Root mean square error

Correction

No correction that requires either the return of imagery to the supplier for reprocessing, or the capture of new imagery specifically to correct an error, will take place unless Ordnance Survey believes that failure to do so would have serious consequences for customers' ability to use the data.

Improvement

Resources are directed towards continually improving the acceptable quality levels for absolute accuracy with each update of the Imagery.

New imagery

The following quality statements are specific to imagery created after 1 January 2003:

Absolute accuracy

Definition

Absolute accuracy is a measure that indicates how closely the coordinates of a point in the Imagery Layer agree with the true coordinates of the same point on the ground in Ordnance Survey National Grid.

Two data capture standards apply to the Imagery Layer:

Urban and rural areas encompassing all 1:1250 and most 1:2500 topographic basic scale areas, as well as a few small 1:10 000 topographic basic scale areas.

Designated sparsely populated areas encompassing the majority of 1:10 000 mountain and moorland and some 1:2500 topographic basic scale areas.

The imagery accuracy area coverage map, located on the OS web site, states which capture standard applies to each tile within the imagery layer.

Measurables

The comparison between the position recorded in the Imagery Layer and the true position of the feature on the ground.

Conformity

Data capture standards	RMSE
Urban and rural areas	1.1 m
Designated sparsely populated areas	4.0 m*

* 3.4 m applies to any imagery created from photography flown in areas of designated sparsely populated areas after 1 March 2004.

Correction

No correction that requires either the return of imagery to the supplier for reprocessing, or the capture of new imagery specifically to correct an error, will take place unless Ordnance Survey believes that failure to do so would have serious consequences for customers' ability to use the data.

Improvement

Resources are directed towards continually improving the acceptable quality levels for absolute accuracy with each update of the imagery.

Radiometric accuracy

Definition

Radiometric accuracy is a measure of the colour balance, luminosity and contrast of the image.

Measurables

The mean histogram (luminosity).

The mean of the individual bands.

The standard deviation for each band.

Conformity

The mean histogram (luminosity), has a value between 100 and 128 +/- 10% (90 to 141).

Red band mean = 110 +/-15% (94 to 126); SD $\geq$ 30.

Green band mean = 118 +/-15% (100 to 136); SD $\geq$ 28.

Blue band mean = 90 +/-20% (72 to 108); SD $\geq$ 23.

Colour band must conform across the whole block that is supplied.

The specification values ensure consistent balanced imagery. In areas where the specification could not be met (in areas of homogeneous colour, for example woodland) the shadow areas show detail and generally have greyscale values of 30 or less, and highlight areas show detail and generally have greyscale values over 225. The colour balance will be consistent with the surrounding area.

Correction

No correction that requires either the return of imagery to the supplier for reprocessing, or the capture of new imagery specifically to correct an error, will take place unless Ordnance Survey believes that failure to do so would have serious consequences for customers' ability to use the data.

Improvement

Resources are directed towards continually improving the acceptable quality levels for radiometric accuracy with each update of the Imagery.

Known data conformance issues

Completeness

Feature for the sea

OS MasterMap does not include a feature for the sea. The effect of this is that beyond the last intersecting feature of a body of tidal water there will be no feature within the data. In the case of some large tidal estuaries this will be a considerable way inland.

Text features

There are currently no accents on text features.

Non-intuitive features

Not all features are intuitive where real-world objects do not exist to bound off logical entities. Typical examples are path networks that can extend for considerable distances and are represented by a single feature.

Inferred links

Inferred links have been created to split up some features, currently roads and some open-plan gardens. These inferred links have been generated by software and in some cases are not directly relevant to the ground situation.

timeQualifiers for ITN (Roads) RRI features

timeQualifiers that apply to exceptions rather than the restriction itself are not present in the first release.

Tunnels in ITN (Roads)

Tunnels are not described as an environmentQualifier in release 1.

Road features ITN (Roads)

Road features representing named or numbered roads are generated automatically and may on rare occasions combine two or more roads or split a single road.

Temporal accuracy (consistency)

Supply of unchanged features

It is possible that a very small number of features may be supplied as change-only updates that have not changed since the last customer supply because the database that OS MasterMap is populated from does not currently include time stamping. This is to ensure that all possible changed features are included in customer supply.

Features across supply chunks

When change-only update is supplied in chunks, features may disappear entirely yet remain or newly appear in another. To facilitate effective update, customers should delete all features from each chunk then apply updated and new features to prevent accidentally deleting features that persist.

Versions and reasons for change

There is not necessarily a one-to-one relationship between the version and reasonForChange attribute. It is possible that a new version of a feature could be generated without the reasonForChange attribute being updated. A typical example would be when the bounding features of an area change, the area itself may not record the reasonForChange.

Versions

Version numbers record the changes that have been made to an OS MasterMap feature; they may not reflect the number of real-world changes a feature has undergone. For example, a building may be modified two or three times before Ordnance Survey captures all of the changes in one operation.

A feature that exists across more than one Ordnance Survey historic tile will have its version incremented by however many tiles are affected for what may be only one real-world change. In some cases the initial incarnation of a feature will have a version greater than one.

Versions are an effective method of ensuring that the same incarnation of a feature is being referred to. However a high version number does not always indicate a real-world object that has been subject to a large number of changes.

Update

Features may be supplied as a new version without any change being apparent to the customer. This is due to changes in attributes that modify a feature but that attribute is not supplied to a customer.

Logical consistency

Quality improvement and life cycles of OS MasterMap features

Quality improvement initiatives to create more logical features will result in update that may create new versions or even delete existing features and replace them with new ones. This will not be reflecting any real-world change. The number of features affected is likely to be small and is limited to particular types of feature such as paths and tracks, inferred links and some very large features.

Transitory incorrect features

The tile-based update of OS MasterMap means, occasionally, features will not be formed correctly. This is indicated by the attribute <broken=true>. Whilst *logically correct*, in that they meet the specification, such features are of limited use to customers.

At April 2002, 0.13% of area features, which cover 0.14% of the total surface area of Great Britain, fell into this category.

Landform area features

Some landform area features do not have the required line geometry to form correctly. In these cases the line geometry will be supplied but no area feature created. Typical features affected are pits, cliffs and coastal slopes.

Landform features do not topologically structure with other features in the land theme. Therefore, this does not prevent complete area feature coverage from being generated.

Some landform features are being improved and will be made available in a future release of OS MasterMap.

Update of OS MasterMap Topographic and ITN (Roads) data

OS MasterMap Topographic data and ITN (Roads) data are currently updated semi-independently. Because of this when change occurs there may be a small delay until both themes are synchronised to include information about the same real-world change. This may either manifest as a road feature in the ITN (Roads) theme not within the Topography theme or vice versa.

This also has an impact on the refererenceToTopographicArea attribute of RoadLink and RoadNode features when they have no topographic features to reference.

Attribute accuracy

Unclassified features

There are a small number of unclassified area features, and a larger number of unclassified text and point features. These all appear in the land theme. A significant proportion of text and some point features will be correctly themed by a future release of OS MasterMap.

At 30 November 2001, 0.05% of area features were unclassified.

Heritage theme

The heritage theme currently contains very little information. Most of the features that would be considered to be heritage features fall in the land theme.

Tracks and paths

Tracks and unmade paths are not explicitly identified by descriptive group and currently appear in the land theme, not the roads, tracks and paths theme. This is likely to be addressed by a future release of OS MasterMap.

Dual themes

Some area features may intuitively belong to more than one theme, for example, a railway station. Currently the vast majority of area features will only belong to one theme. Some area features may become dual themed in a future release of OS MasterMap.

Referencing from OS MasterMap ITN (Roads) Layer to OS MasterMap Topography Layer.

The referenceToTopographicArea attribute from RoadLink and RoadNode features is currently based upon spatial intersection. Therefore where one road crosses another at different levels, the RoadLink and RoadNode features on the lower level will reference TopographicArea features at a higher level than the road they actually represent.

The Topography Layer has been significantly revised during the creation of the OS MasterMap ITN (Roads) Layer, particularly road area features. In the first release of the OS MasterMap ITN (Roads) Layer the referenceToTopographicArea attribute from RoadLink and RoadNode features may be out of date, referencing topographic features no longer existing or with incomplete references.

Multilingual names

The GML language qualifier for English, Gaelic and Welsh names for Road features has not been applied consistently. Bilingual names are present but not correctly described as English, Gaelic or Welsh.

Deleted and reinserted addresses on PAF

Occasionally the source address on PAF will have been deleted and reinserted as a new address by Royal Mail during update, instead of making an amendment to the existing address.

The effect will be that the address will appear with a new TOID for the same address.

In most instances, Ordnance Survey prevents this effect in the data supplied by using software to identify and prevent this occurring in the data, but cannot guarantee to be 100% successful.

Imagery Layer

Every effort is made to ensure that the Imagery Layer matches the Topography Layer, however there will be occasions where this does not occur, for example, in rural areas where PAI has not taken place or where the Topography Layer is awaiting update.

Appendix A Glossary

The purpose of this chapter is to provide a glossary of terms used in the definition of products, services, licensing and other terms and conditions for OS MasterMap and OS MasterMap-based products.

Where terms refer to other terms within the glossary, they are connected by means of hot links to the relevant entries.

account
Every OS MasterMap customer has an account. This is more than just a financial account, but is an overarching term for the agreements, orders, access rights and financial arrangements that a customer has with Ordnance Survey.

addressed premise
A permanent or non-permanent location with an address being a potential delivery point for Royal Mail. Examples of an addressed premise are a house, a flat within a block of flats, a caravan site, a bollard to which several houseboats may be moored or an organisation occupying the whole or part of a building.

ancestry
The ability of a feature to reference deleted features that have some relationship to it. Ancestry is not currently a feature of OS MasterMap.

application service provider(ASP)
A company that offers individuals or enterprises access over the Internet to application programmes provider (for example, GIS) and related services that would otherwise have to be located in their own personal or enterprise computers.
This may also include access to relevant related data.

area feature
A polygonised representation of a real-world object. Each area bounded by a continuous closed chain of line features is an area feature.

The geometry of an area feature consists of an external boundary, and optionally one or more inner boundaries (*holes* in the area feature). Each boundary is represented by a polygon.

An area feature may be used to represent a building, field, lake, administrative area and so on.

area of interest
The spatial extent that a customer has access to for a specific product. This area of interest may include a number of different spatial extents.
The area of interest is an integral part of a contract.

area of order
The spatial extent of data requested by a customer as part of an order. It may comprise a number of different spatial extents, but all of them will fall completely within the customer's area of interest.

associated data
Datasets held by third parties that have been linked to features within OS MasterMap by means of identifiers (TOIDs).

attribute
Any item of information packaged in an OS MasterMap feature. The TOID and the geometry of the feature are both attributes of the feature.
In GML and XML documents and specifications this term is used in a different way. This usage is noted in the OS MasterMap specifications as appropriate.

attribute set
A group of attributes that can legitimately be used together. Each feature type uses a particular attribute set.

change-only update (COU)
The ability to supply to a customer only those features that have been created or changed since a specified date. Change-only supply includes a list of the TOIDs of deleted features.
In the OS MasterMap context the selection of changed data will be by change-since date (that is, all change since the 00:00 hours on the specified date). It is not possible to select change since your last update. Therefore the customer system must recognise repeatedly supplied features.

change-since date
The date used, when requesting change-only update that indicates the date since which change is required. This will result in the supply of all change in the database, since the beginning (that is, 00:00) of that day.

chunking
The process of breaking up the area of order into manageable, physical units of supply (that is, files) for supply to the customer.

comission
Features are captured that do not conform to the specification. Features representing departed real-world objects remaining in the data.

commercial service provider
See application service provider.

complex feature
A feature that is a collection of other features.
An example could be a feature representing a river, composed of many area and line features representing parts of the river.
Complex features are not currently a part of OS MasterMap.

contract
The agreement that a customer has for access to Ordnance Survey products and services. An OS MasterMap contract will be defined in terms of an area of interest, a list of themes, a time period, the number of terminals the data will be used on and a set of terms and conditions.

coordinate transformation
A computational process of converting an image or map from one coordinate system to another.

customer
An organisation or individual that makes use of Ordnance Survey's data supply facilities.
This includes both direct sales customers of Ordnance Survey and Ordnance Survey Options™, as well as customers of Licensed Partners.
It does not include anyone, or any organisation, that has access to Ordnance Survey material without charge.

dataset
An identifiable set of data that share common characteristics and that are managed as a subset of the data within a database.
For example, TOPO, ROADS and ADDRESS are Ordnance Survey datasets from which the products Land-Line, OSCAR® and ADDRESS-POINT are respectively derived.

deletion
1 The removal of a feature from the OS MasterMap database.
2 The inclusion of the TOID of such a feature as a departed feature in change-only update.

delivery mechanism
The method of supply of data to a customer (for example, off-line, online).

departed feature
A feature supplied as part of a change-only update supply, which has either been deleted, has changed theme, or has moved outside of the area of order since the specified change date.

descriptive group
See the Reference section, OS MasterMap user guide.

descriptive term
See the Reference section, OS MasterMap user guide.

digital identifier
An identifier that is primarily intended to provide unique and unambiguous feature identification for the purposes of exchanging feature based information between computer systems, or associating data within a computer system.

The Digital National Framework™ (DNF®)
A nationally consistent geographic referencing framework for Great Britain. Comprising the National Grid and the National Topographic Database that defines each geographical feature as it exists in the real world with a maintained unique reference allocated to each feature. The DNF is not a product; it is the framework on which our future products will be based.

direct sale
A direct transaction between Ordnance Survey and a customer.

direct sale price
Those prices that are applied where Ordnance Survey sell OS MasterMap-based products and services directly to customers.

e-delivery
The delivery of Ordnance Survey digital products and services to customers by electronic means, primarily by use of Internet technology.

e-ordering
The ability for customers to request the supply of products and services by the use of Internet technology.

estimate
A single price being offered to the OS MasterMap customer, as the cost of a proposed service definition agreement.

event type
The type of event that has resulted in a new version of a feature. This could be created, modified or deleted.

feature
An abstraction of a real-world object. It is not the real-world object itself.

The OS MasterMap product is composed of discrete vector features, each of which has a feature type, geometry, and various feature attributes.

feature attribute
See attribute.

feature code
See the Reference section, OS MasterMap user guide.

feature topology
See topology.

feature type
A high level grouping of features that are treated in a similar way, for example TopographicPoint or RoadLink features.

FTP
File transfer protocol. A protocol that allows a user on one computer to transfer files to and from another computer over a TCP/IP network (for example, Internet).

geoid
An imaginary shape for the Earth defined by mean sea level and its imagined continuation under the continents at the same level of gravitational potential.

georectified imagery
The georectification method is a very simple process that uses detail points visible in the image and on the map. The image is then warped to fit the map on those points. There is no information to ensure that the image fits the map elsewhere.

GML
Geography Mark-up Language. An XML encoding for the transport and storage of geographic information, including both the geometry and attributes of geographic features.

GPS
Global Positioning System. A satellite-based navigational system allowing the determination of any point on the Earth's surface with a high degree of accuracy given a suitable GPS receiver.

history
In the context of geospatial data, the storage of deleted features and superseded versions of features.

independent polygon
One of the options for OS MasterMap product feature geometry/topology, in which the data is simplified into area, point and line features with no relationship between them, and with their own explicit geometry.
For example, in the independent polygon product the bounding line between two areas will be represented three times, each with their own description of the geometry once as a line feature, once as part of the bounding line of the first area feature, and once as part of the bounding line of the second area feature.
This is distinct from the topological polygon product. The difference only lies in the representation of polygons – there is no difference in point and line geometry types.

inferred links
Line features representing inferences about the real world, rather than topographic statements of fact. These sensibly subdivide certain types of area feature where there is no appropriate topographic detail. They are normally used to:

- divide road sections;
- separate individual garden plots in residential areas where no dividing fence, hedge or wall exists;
- close junctions between roads and car parks or hardstanding areas; and
- close fields that have simple breaks in the hedge or wall rather than gates.

These are automatically created using software.

layer
A layer is a group of related OS MasterMap themes. A layer may consist of one or more themes. For instance, the Topography Layer is composed of nine themes, whereas the Address Layer contains only one theme.

Licensed Partner
Any organisation that has entered into a formal licence agreement with Ordnance Survey to market map information or to incorporate map data with their application or service.

life cycles
The series of events that occur in the life of a real-world object or the OS MasterMap feature(s) that represents it. This will always include those events that result in creation and deletion, and may also include events that result in amendments or change.

line
The straight line segment between two given points. Not to be confused with polyline or line segment feature.

line feature
The OS MasterMap abstraction of a linear object such as a wall or riverbank.

The geometry of a line feature is a polyline – an ordered string of points.

A particular line feature will often represent only part of an object. For example, a line feature may represent a linear entity (for example, part or all of a fence), the boundary of an area (for example, a house) or both (for example, a fence around a field).

local holdings
The situation where a customer has to hold and manage data that is supplied to them.

make
An attribute indicating whether the land surface is natural or man-made. See the Reference section, OS MasterMap user guide.

media supply
See off-line supply.

metadata
Graphical or textual information about the content, quality, condition, origins, and characteristics of data.

National GPS Network
The infrastructure of active and passive GPS reference stations that allow surveyors to determine precise coordinates in GPS and British National Grid spatial reference systems.
The National GPS Network provides the physical definition of the British National Grid, the primary spatial reference system used in OS MasterMap.
A central component of the Digital National Framework.

National Grid
A unique referencing system that can be applied to all Ordnance Survey maps of Great Britain at all scales. It provides an unambiguous spatial reference for any place or entity in Great Britain.

object-based data
Data in which one entity (that is, one feature) represents one real-world object (for example, a building or land parcel).

off-line supply
The supply of data to a customer on physical media (for example, CD, DVD).

online supply
The supply of data to a customer using Internet technologies.

order
A request from a customer for the supply of data. The scope of an order may be constrained by an agreement for a period-licence service.

orthorectified imagery
The Imagery Layer is orthorectified. An orthoimage is achieved through a rigorous mathematical modelling of the camera position/direction and the terrain surface at the moment of image exposure. A software process is then able to move each of the pixels in the image individually into its correct National Grid position.

The process eliminates displacements due to image perspective and pointing direction (the aircraft is moving and rolls around all axes) and topographic relief and therefore results in an image having the same geometric properties as a map projection.

pay as you go
See pay as you use service.

Pay-as-you-use-service
A service provided by Licensed Partners giving access to Ordnance Survey data for business use on a transaction basis as an added-value service.

PAYU
Pay As You Use.

period licence
A licence to use a data product, or any other value-added service or product derived from detailed datasets, for business use for an agreed period of one or more years. It covers the initial supply of the data, and supply of update.

period-licence service
A service provided to customers by Ordnance Survey or Licensed Partners giving access to Ordnance Survey data for business use, including update maintenance. The service will be for a defined period.
These services will be available under a period licence agreement.

physical level
A feature attribute giving an ordinal classification applied to vertical relationships between various features or within feature collections.

In the OS MasterMap context, this is the level at which the feature lies (that is, underground, obscured, ground level, or a level above ground).

physical presence
A feature attribute indicating whether a feature represents an obstructing or non-obstructing real-world object. Also includes several other possible values.

point
See Reference section, OS MasterMap user guide.

point feature
A feature representing a real-world object. The geometry of a point feature is a single point (a pair of coordinates) with optional size and orientation.

polygon
The polygon geometry type is used to specify the outer and inner boundaries of an area feature. In topological polygon data a polygon consists of a closed chain of line features, specified by reference to the TOIDs of those line features. Each line feature is used either forwards or backwards in the chain. In independent polygon data a polygon consists of an ordered list of coordinated points explicitly specifying the polygon geometry.

polyline
See Reference section, OS MasterMap user guide.

positional accuracy
The accuracy of the feature geometry relative to the coordinate spatial reference system.

property
See attribute.
In GML documents this term has a formal meaning that is not used elsewhere.

real time
An immediate response. The processing of data by a computer as rapidly as the data is input, or within some small upper limit of response time.
This is NOT synonymous with online.

real-world object
The real thing represented by a feature. For instance, a building, a section of fence, the boundary of a wood, a sharp change of gradient.

rectangle
See Reference section, OS MasterMap user guide.

representative point
A point feature used to represent a real-world object (for example, centroids, seeds, area labels). Representative points are not included in OS MasterMap data.

seamless database
In the OS MasterMap context, this refers to a geospatial database in which there is no concept of geographically splitting the data for management purposes. All features are complete, and there is no underlying tile structure.

SLA
Service level agreement.

spatial reference system
The term used in GML (and hence in OS MasterMap specifications) for the definition that allows spatial positions to be stated as coordinate tuples. The only spatial reference system currently used in OS MasterMap is the British National Grid.

supply format
The file format in which the data is supplied to the customer.

surface make
See make.

terminal multiplier
A pricing multiplier that reflects the number of terminals or workstations that have access to Ordnance Survey data (whether simultaneous or not).

theme
A collection of features that form some logical set, for example, buildings, water, land.

In the OS MasterMap context, themes are a collection of features that are either similar in nature or are related to specific usage. A single feature may be in one or more themes. They are designed to allow the easy selection of features. They do not form part of the classification of the feature. The theme exists purely to facilitate customer data selection.

tile
A self contained rectangular subset of digital data, used to subdivide that data into manageable units. OS MasterMap data has no tiles.

TOID
A number that uniquely identifies every feature. No intelligence (for example, its coordinate position) about the feature can be derived from either the allocated number or the process by which it is allocated.
The TOID will remain with the feature throughout its life and will not be reassigned to a new feature when the existing feature is deleted.

topological polygon
One of the options for OS MasterMap product feature geometry/topology, in which area features use references to line features to describe their geometry. In topological output the bounding line between two area features will only be represented once, as a line feature. The two area features will contain a reference to this line feature as part of their bounding line, rather than explicitly describing the geometry of that line themselves.
This is distinct from the independent polygon product.

topology
A fully structured data model in which area features reference the line features that bound them and bounding lines are shared between area features. As such, areas know which areas they are surrounded by and which areas they contain. OS MasterMap data is not supplied in fully topological form.

tuple (coordinate tuple)
A set of n coordinates representing a point in n dimensional space, as defined by a spatial reference system.
The British National Grid reference system is 2-D only, so coordinate tuples consist of an easting and a northing coordinate.

unclipped (data supply)
All features that wholly or partly lie within the query area are supplied, and the full geometry of each of these features will be included in the supply.
OS MasterMap data is supplied unclipped.

unit of supply
The definition of the way in which the area of order is broken up into manageable, physical units (that is, files) for supply to the customer.

version
See version.

version date
See Reference section, OS MasterMap user guide.

version number
A version number will identify that a feature has been altered. Version numbers will be allocated sequentially, with version 1 representing the creation of the feature.

XML
Extensible Mark-up Language. A flexible way to create common information formats and share both the format and the data on the Internet, Intranets, and elsewhere. XML is extensible because, unlike HTML, the mark-up tags are unlimited and self-defining. XML is a simpler and easier to use subset of the Standard Generalised Mark-up Language (SGML), the standard for how to create a document structure.

Appendix B Categories of change

Category A

- New housing and associated features, including demolition, but excluding extensions to private dwellings.
- Commercial, industrial, community and public-sector buildings and associated features, including extensions to existing buildings greater than 0.25 hectares and any demolitions of similar size.
- Communications networks (roads, including carriageway alterations due to traffic-calming schemes, railways, airports, transmission lines, communication masts and so on) and associated features, including demolition.
- Road Routing Information such as restricted turns, one-way streets and so on.
- Distinctive names associated with the above.
- Major sea defences designed to reduce the risk of flooding to the coastal areas.
- Major non-coastal flood defences designed to reduce the risk of flooding.
- Property boundary fences when part of a major refurbishment programme that makes a significant impact on map data.
- Traffic-calming measures.
- Mobile/park homes that are permanent residential properties with a postal address.
- Major landscape changes > 0.5 km^2, for example, landfill, quarries, and coastal changes.

Category B

In general, all features not defined as category A or category C will be considered to be category B; the following are typical examples:

- Significant agricultural and horticultural buildings > 0.25 hectares in size.
- Other agricultural and horticultural buildings < 0.25 hectares in size.
- Quarries and other surface workings.
- Field boundaries.
- Water features (ponds, lakes, rivers, canals, landing stages and jetties and so on).
- All vegetation.
- Tracks and paths, including driveways >100 m long in private gardens.
- Telephone call boxes and letter boxes.
- Extensions to commercial, industrial, community and public sector buildings less than 0.25 hectares in extent.
- Apparent property boundary features not in category A, that is, those erected since the initial development and not part of refurbishment programmes.
- Mean high and low water when affected by change to other features in category A and B.

Category C

Category C is not currently revised but is retained within the specification either to meet current customer needs, to allow for changing customer priorities in the future or to allow sensible completion of category A and B revision.

- Extensions to existing private residential buildings.
- Private garages.
- Street furniture such as guide posts, mile stones and water taps.
- Archaeological information.

Categories of land

Urban

All contiguous built-up areas that are over 20 hectares in extent and that have a population greater than 1 000.

Rural

All parts of Great Britain excluding those areas defined as either urban or moorland.

Moorland

All areas of undeveloped topography currently defined by the extent of original capture at 1:10 000 scale.

The area covered by each of the categories can be seen at www.ordnancesurvey.co.uk/products/landline/tileselector.html.

Units of change

Examples of the value of units of change for measuring temporal validity (currency).

Feature description	Value
A new house and associated features, including boundary features, name/number and associated garages (see note 1).	1.25
New commercial, industrial, public sector and farm developments with buildings and associated features, captured at the time of the initial development. Including boundary features, car parks and private access roads.	20 per hectare
Extension to an existing house.	0.25
Extensions to existing commercial, industrial, public-sector and farm buildings or developments (see note 2).	1 per 0.05 hectare

Feature description	Value
Property boundary features when part of a major refurbishment programme that makes a significant impact on map data.	0.25 per feature/line
Significant alteration to an existing property boundary feature, such as a fence or wall.	0.25 per feature/line
New motorways and dual carriageways, including associated boundary features, vegetation, slip roads and interchanges (see note 3).	10 per 100 m
New single-carriage roads, railways (per pair of tracks) and canals, including associated paths, fences and boundary features.	5 per 100 m
New kerb lines, changes in existing kerb alignment and posts used to separate traffic, not associated with new roads.	1 per 100 m
Electricity transmission lines (ETLs), including pylons and supporting posts.	2 per 100 m
Traffic-calming measures.	0.25 per line feature
Pipelines.	2 per 100 m
Sea defences.	2 per 100 m of linear feature
New or additional distinctive names.	1 per name
Communication masts.	1 per mast
Quarries, reservoirs, ponds and lakes.	1 per 100 m of bounding feature
Major changes to river courses and water features, including the addition of landings, stages and jetties.	2 per 100 m
Tracks and made paths.	2 per 100 m
Unmade paths.	1 per 100 m
Changes in surface, forestry or vegetation classification.	1 per change
Changes in extent of surface, forestry or vegetation classification (see note 4).	1 per 100 m of pecks

Feature description	Value
Fences, hedges, ditches and walls that are not specifically property boundaries.	1 per 100 m
Demolition or deletion of a feature.	25% of HU value of demolished feature
Alteration to existing house name or number.	1 per 5
Extensions or alterations to car parks, including addition of fencing, traffic islands or roundabouts within car parks.	1 per 100 m of pecks or fencing
Garages and blocks of garages not captured during initial development.	0.25 per garage
Mean high and low water.	1 per 100 m
Selected street furniture – guide posts, milestones, and water taps.	0.25 per feature
Changes to archaeological information.	Relate to feature

Notes

1 Where the capture of a new property and its associated features is incomplete at the time of recording the change, 1.0 HU should be recorded for the complete building, and 0.25 for the associated features.

2 These could be an extension to existing buildings or the extension of a development to include new roads car parks fences and buildings. In the case of a building being extended with minimal change to its immediate environment, only the building area is used to calculate the HU value. Where the change includes building extensions, new buildings and associated features such as additional car parks, roads and boundary features, the area of the change is used to calculate the HU value

3 The HU count of the motorway or dual carriage is all features that lie within the real or perceived boundaries of the highway.

4 This is the linear measurement of the pecked line used to define the extent of an area of vegetation where there are no other features bounding the area.

NOTE: To ensure consistency, software should be used for the linear and area measurements required to give an HU value.

Appendix C Product and service performance report form

Ordnance Survey welcomes feedback from its customers about OS MasterMap.

If you would like to share your thoughts with us, please print a copy of this form and when completed post or fax it to the address below.

Your name: ..... Phone: .....

Organisation: ..... Fax: .....

Address: ..... Email: .....

.....

..... Customer account number: .....

Postcode: ..... Date of submission of form: .....

Please record your comments or feedback in the space below. We will acknowledge receipt of your form within 3 working days and provide you with a full reply or a status report within 21 working days.

If you are posting this form, please send it to:

Customer Contact Centre, Ordnance Survey, Romsey Road, SOUTHAMPTON, SO16 4GU.

Fax: 023 8030 5477